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Wi-FIRE™ Board Reference Manual

Revised December 7, 2017
This manual applies to the Wi-FIRE rev. D

Production Release

The production boards of the Wi-FIRE are manufactured using the Microchip PIC32MZ2048EFG100 MCU. Earlier pre-production, Rev B and earlier, uses the PIC32MZ2048ECG100 MCU. The MCUs are pin for pin compatible, however the PIC32MZ2048EFG100 has substantially improved ADCs, and there is an FPU coprocessor. For the most part, code written to the pre-production Wi-FIRE will run unaltered on the Rev C or newer Wi-FIREs, with the exception of the ADCs. The Digilent core will support either MCU, even with respect to the new ADCs, as long as the Arduino hardware abstraction API, analogRead(), was used; no sketch source code change is required. The production PCB is identical between the Rev B and Rev C, with the exception of the silk screen to indicate Rev C.

Rev D boards now include a new header for MIPS JTAG debugging and iFlowtrace and a few hardware changes to support this connector. Most components on the board remained the same, although nearly all of the silk screen designators were changed from Rev C.

Overview

The Wi-FIRE is based on the popular Arduino™ open-source hardware prototyping platform and adds the performance of the Microchip PIC32MZ microcontroller. The Wi-FIRE has a WiFi MRF24 and SD card on the board, both with dedicated SPI signals. The Wi-FIRE board takes advantage of the powerful PIC32MZ2048EFG microcontroller. This microcontroller features a 32-bit MIPS M5150 processor core running at 200 MHhz, 2MB of flash program memory, and 512K of RAM data memory. The Wi-FIRE can be programmed using the Arduino IDE with the Digilent Core. It contains everything needed to start developing embedded applications. The Wi-FIRE features a USB serial port interface for connection to the Arduino IDE and can be powered via USB or by an external power supply. In addition, the Wi-FIRE is fully compatible with the advanced Microchip MPLAB®X IDE and works with all MPLAB ®X compatible in-system programmer/debuggers, such as the Microchip PICkit™3 or the chipKIT PGM. The Wi-FIRE is easy to use and suitable for both beginners and advanced users experimenting with electronics and embedded control systems.

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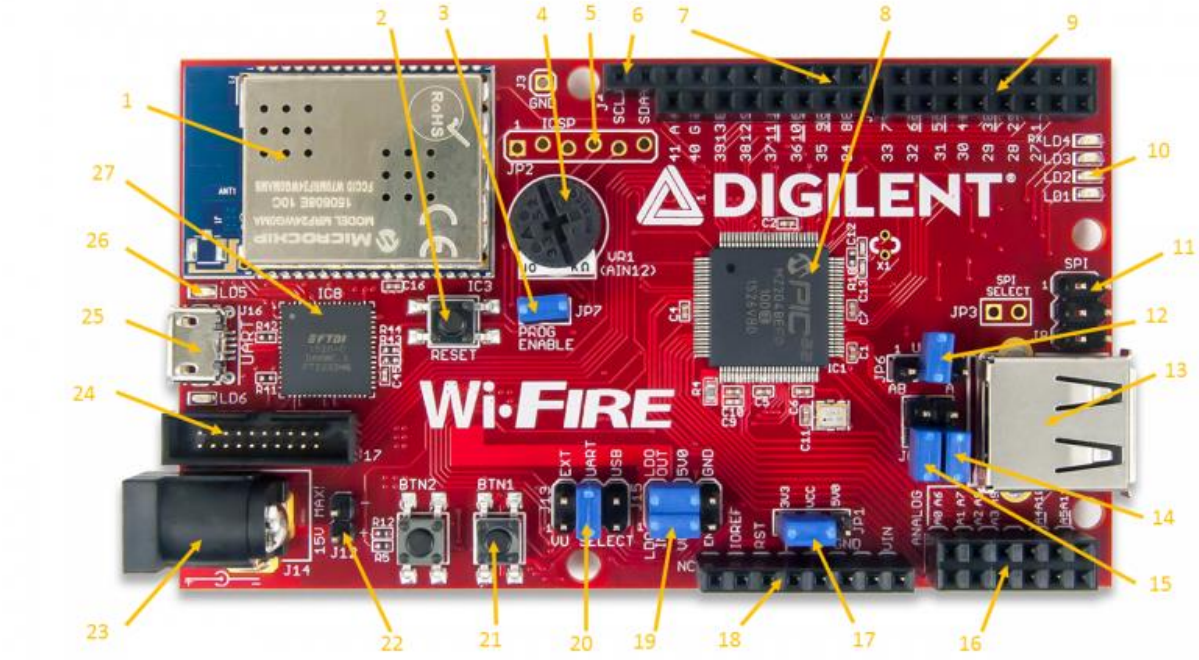
The Wi-FIRE board.

- Microchip® PIC32MZ2048EFG100 microcontroller (200 MHz 32-bit MIPS M5150, 2MB Flash, 512K RAM)
- Microchip MRF24WG0MA WiFi module
- Micro SD card connector
- USB 2.0 Hi-Speed OTG controller with A and micro-AB connectors
- 50 MHz SPI
- 43 available I/O pins
- Four user LEDs
- PC connection uses a USB A > micro B cable (not included)
- 12 analog inputs
- 3.3 V operating voltage
- 200MHz operating frequency
- 7 V to 15 V input voltage (recommended)
- 30 V input voltage (maximum)
- 0 V to 3.3 V analog input voltage range
- High efficiency, switching 3.3 V power supply providing low power operation

1 Wi-FIRE Hardware Overview

The Wi-FIRE has the following hardware features:



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Call Out	Component Description	Call Out	Component Description
1	IC3 – Microchip MRF24WG0MA WiFi Module	14	JP5 – Host USB Bus Power Enable
2	Reset	15	JP4 – USB Overcurrent Detect
3	JP7 – Reset Disable	16	J6 – Analog and Digital Signal Connector
4	Potentiometer	17	JP1 – 3.3 V / 5.0 V Shield Voltage Select
5	JP2 – Microchip Debug Tool Connector	18	J1 – Shield Power Connector
6	J4 – I2C Signals	19	J15 – 5.0 V Regulator Configuration
7	J5 – Digital Signal Connector	20	J13 – Power Select Jumper
8	PIC32 Microcontroller	21	User Buttons
9	J6 – Digital Signal Connector	22	J12 – External Power Connector Pin Connector
10	User LEDs	23	J15 – External Power Connector Barrel Jack
11	J8 – SPI Connector	24	JTAG/TRACE Programming/Debugging Header
12	JP6 – USB Host or OTG Select	25	USB connector for USB Serial Converter
13	J10 & J11 – USB Connectors	26	Serial Communication LEDs

Table 1. Hardware description.

2 Arduino IDE and USB Serial Communications

The Wi-FIRE board is designed to be used with the Arduino IDE with the Digilent core. Users can learn how to download the Digilent Core for the Arduino IDE from our guide here.

The Arduino IDE uses a serial communications port to communicate with a boot loader running on the Wi-FIRE board. The serial port on the Wi-FIRE board is implemented using an FTDI FT232RQ USB serial converter. Before attempting to use the Arduino IDE to communicate with the Wi-FIRE, the appropriate USB device driver must be installed; when you connect the Wi-FIRE on a Windows machine, the appropriate driver should install automatically.

The Wi-FIRE board uses a standard micro-USB connector. Generally, a USB A to micro-B cable is used for connection to a USB port on the PC.

When the Arduino IDE needs to communicate with the Wi-FIRE board, the board is reset and starts running the boot loader. The Arduino IDE then establishes communications with the boot loader and uploads the program to the board.

When the Arduino IDE opens the serial communications connection on the PC, the DTR pin on the FT232RQ chip is driven low. This pin is coupled through a capacitor to the MCLR pin on the PIC32 microcontroller. Driving the MCLR line low resets the microcontroller, which restarts the execution with the boot loader.

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This automatic reset action (when the serial communications connection is opened) can be disabled. To disable this operation, there is a jumper labeled JP7, which can be disconnected. JP7 is normally shorted, but if the shorting block is removed, the automatic reset operation will be disabled.

Two red LEDs (LD5 and LD6) will blink when data is being sent or received between the Wi-FIRE and the PC over the serial connection.

3 Power Supply

The Wi-FIRE is designed to be powered via USB (J16), from an external power supply (J12 or J14), or from the USB OTG receptacle (J10). Jumper block J13 is used to select which power supply is used. The power supply voltage selected by J13 is applied to the unregulated power bus, VU.

In order to operate the Wi-FIRE as a USB device powered from the USB serial interface, (connector J16), place a shorting block in the UART position of jumper block J13. To operate the Wi-FIRE from an external power supply, attach the power supply to either J12 or J14 and place a shorting block in the EXT position of J13. Be sure to observe correct polarity when connecting a power supply to J12, as a reversed connection could damage the board. To operate the Wi-FIRE as a USB powered device from the USB OTG connector (J10), place a shorting block on the USB position of J13. This will normally only be done when running a sketch on the board that programs it to operate as a USB device. The power supply section in the Wi-FIRE provides two voltage regulators, a 3.3 V regulator and a 5 V regulator. All systems on the Wi-FIRE board itself operate at 3.3 V and are powered by the 3.3 V regulator. The 5 V regulator is used to provide power for external circuits, such as shields, that require 5 V for operation and to supply USB 5.0 V when the Wi-FIRE is used as a USB Host. The 5 V regulator can be completely disabled if it is not needed for a given application.

When a shield is used, connector J1 provides power to the shield. Connector J1 pin 8 provides VIN as applied by the external power source J12 or J14. If no power is provided to J12 or J14, VIN will not be powered. For most shields, pin 5 on connector J1 would provide 5.0 V to the shield; however, the Wi-FIRE is not 5 V tolerant and it would be very easy for a shield to destroy an input if 5.0 V were applied to the PIC32MZ. For this reason, JP1 was added to control the voltage supplied to the shield's 5 V source. By default, JP1 is loaded to supply only 3.3 V on the 5.0 V pin so that the shield does not get 5 V and thus cannot inadvertently apply 5.0 V to any input to the Wi-FIRE. If the shield requires 5.0 V to operate, the shield will not work when 3.3 V is applied; JP1 must be selected to provide 5.0 V for the shield to work. However, extreme caution should be used when selecting 5.0 V on JP1 to ensure that the shield will observe IOREF and not supply 5.0 V to any input to the Wi-FIRE; as this will damage the input to the PIC32MZ on the Wi-FIRE.

The Wi-FIRE board is designed for low power operation and efficient use of battery power; a switching mode voltage regulator is used for the 3.3 V power supply. This switching mode regulator is made up of a Microchip MCP16301 and associated circuitry. It can operate on input voltages from 4 V to 30 V with up to 96% efficiency, and is rated for 600 mA total current output. The MCP16301 has internal short circuit protection and thermal protection. The 3.3 V regulator takes its input from the unregulated power bus, VU, and produces its output on the VCC3V3 power bus. The VCC3V3 bus provides power to all on-board systems and is available at the shield power connector (J1) to provide 3.3 V power to external circuitry, such as shields.

The 5 V regulator section provides a low dropout linear regulator. The 5.0 regulator is provided for powering external circuitry that needs a 5 V power supply, such as providing for USB 5.0 V when the Wi-FIRE is used as a USB Host, or to provide 5.0 V to the shield on J1 with JP1 selected to 5.0 V. This voltage regulator uses an On Semiconductor NCP1117LP. The NCP1117LP is rated for an output current of 1A. The dropout voltage of the

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NCP1117LP is a maximum of 1.4 V at 1A output current. The maximum input voltage of the NCP1117LP is 18 V. The recommended maximum operating voltage is 15 V. However, if the 5.0 V regulator is completely disable by removing all jumpers on J15, the external input voltage applied to J12 or J14 may be as high as the 30 V as limited by the switching mode 3.3 V regulator.

The input voltage to the 5 V regulator is taken from the VU bus, and the output is placed on the VCC5V0 power bus. There is a reverse polarity protection diode in the external power supply circuit. Considering the diode drop plus the forward drop across the regulator, the minimum input voltage to the regulator should be 7 V to produce a reliable 5 V output.

For input voltages above 9 V, the regulator will get extremely hot when drawing high currents. The NCP1117LP has output short circuit protection as well as internal thermal protection and will shut down automatically to prevent damage.

The 5 V regulator selection on J15 provides four 5 V power configurations:

1) 5 V regulator completely disabled and no 5 V power available;
2) 5 V regulator bypassed and 5 V provided from an external 5 V power supply, such as USB;
3) on-board 5 V regulator used to provide 5 V power;
4) External 5 V regulator used to regulate VU and provide 5 V power.

Jumper block J15 is used to select these various options and the following diagrams describe the use of J13. This diagram shows the arrangement of the signals on J15:

Signals	Description
LDO In	The input to the on-board linear regulator.
LDO Out	The output of the on-board regulator.
VU	The unregulated input voltage selected by the jumper setting jumper block J13.
5V0	The connection to the VCC5V0 power bus on the Wi-FIRE board.
EN Ext	Signal provided to enable an external voltage regulator, if one is being used. This would allow the sketch running on the Wi-FIRE to turn on/off the external voltage regulator. When used with an external voltage regulator, this allows the board to go into an extremely low power operating mode. This signal is connected to Port D, bit 13 (RD13) on the PIC32 microcontroller. This is accessible using digital pin 40.
GND	Connection to the digital ground bus on the Wi-FIRE board.

Table 2. Description of signals on J15.

To completely disable operation of the on-board linear regulator, remove all shorting blocks from J15. To use the on-board 5 V regulator, use the provided shorting blocks to connect VU to LDO In, and to connect LDO Out to 5V0, as follows:

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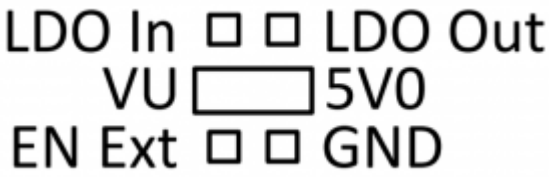
Note: In this case, when J13 is in the EXT position, and J15 is jumpered to regulate the external input, do not apply more than 18 V. This can destroy the 5.0 V regulator.

To bypass the on-board 5 V regulator when powering the board from an externally regulator 5 V power supply, such as USB, use one of the provided shorting blocks to connect VU to 5V0, as follows:



An external 5 V regulator can be used. This would be desirable, for example, when operating from batteries. An external switching mode 5 V regulator could be used to provide higher power efficiency than the on-board linear regulator. In this case, use wires as appropriate to connect VU to the unregulated input of the external regulator. Connect the regulated 5 V output to 5V0. Connect GND to the ground connection of the external regulator. Optionally, connect EN Ext to the enable input control of the external regulator, if available. This allows the external regulator to be turned off for low power operation. Digital pin 50 is then used to turn on/off the external regulator.

The PIC32MZ microcontroller is rated to use a maximum of 60 mA of current when operating at 200 MHz. The MRF24WG0MA WiFi module typically consumes a maximum of 237 mA when transmitting. This allows approximately 303 mA of current to power the remaining 3.3 V circuitry on the Wi-FIRE board and external circuitry powered from the VCC3V3 bus. No circuitry on the Wi-FIRE board is powered from the VCC5V0 power bus, leaving all current available from the 5 V regulator to power external circuitry and the USB 5.0 V power bus when the Wi-FIRE is used as a USB Host.

The POWER connector (J1) is used to power shields connected to the Wi-FIRE board. Pin 1 is unconnected, the following pins are provided on this connector:

- **IOREF** (pin 2): This pin is tied to the VCC3V3 bus.
- **RST** (pin 3): This connects to the MCLR pin on the PIC32 microcontroller and can be used to reset the PIC32.
- **3V3** (pin 4): This routes the 3.3 V power bus to shields.
- **5V0** (pin 5): This routes 3.3 V or 5.0 V power to shields depending on the position of JP1.
- **GND** (pin 6, 7): This provides a common ground connection between the Wi-FIRE and the shields. This common ground is also accessible on connector J3.
- **VIN** (pin 8): This connects to the voltage provided at the external power supply connectors (J12 and J14). This can be used to provide unregulated input power to the shield. It can also be used to power the Wi-FIRE board from the shield instead of from the external power connector. If no power is supplied at J12 or J14 or from the shield, VIN will not have any power on it.

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4 5 V Compatibility

The PIC32 microcontroller operates at 3.3 V. The original Arduino boards operate at 5 V, as do many Arduino shields.

There are two issues to consider when dealing with 5 V compatibility for 3.3 V logic. The first is protection of 3.3 V inputs from damage caused by 5 V signals. The second is whether the 3.3 V output is high enough to be recognized as a logic high value by a 5 V input.

The digital I/O pins on the PIC32 microcontroller are 5 V tolerant. The, whereas the analog capable I/O pins are not 5 V tolerant. There are 48 analog capable I/O pins on the PIC32MZ, and this applies to most GPIO pins on the processor. Historically, clamp diodes and current limiting resistors have been used to protect the analog capable I/O from being damaged but because of the large number of analog capable I/Os and because clamp diodes and resistors will limit the maximum speed at which these I/Os will operate, it was decided that the Wi-FIRE would not be 5 V tolerant. Instead, JP1 was added to allow for the 5V0 bus to the shield to be selectable between 3.3 V or 5.0 V. If 5.0 V is selected, great care must be used to ensure that no input to the PIC32MZ exceeds 3.6 V as that will damage the PIC32MZ.

The minimum high-voltage output of the PIC32 microcontroller is rated at 2.4 V when sourcing 12 mA of current. When driving a high impedance input (typical of CMOS logic) the output high voltage will be close to 3.3 V. Some 5 V devices will recognize this voltage as a logic high input, and some won't. Many 5 V logic devices will work reliably with 3.3 V inputs.

5 Input / Output Connections

The Wi-FIRE board provides 43 of the I/O pins from the PIC32 microcontroller at pins on the input/output connectors J4, J5, J6, J7, and J8.

The PIC32 microcontroller can source or sink a maximum of 15 mA on all digital I/O pins; however, some pins can source or sink 25 mA or even 33 mA, check with the PIC32MZ datasheet for more information. To keep the output voltage within the specified output voltage range (VOL 0.4 V, VOH 2.4 V) the pin current must be restricted to +/- 10 mA on the 15 mA pins, or for the higher current pins check the PIC32MZ datasheet for the maximum currents. The maximum current that can be sourced or sunk across all I/O pins simultaneously is +/- 150 mA. The maximum voltage that can be applied to any I/O pin is 3.6 V. For more detailed specifications, refer to the PIC32MZ Data Sheet available from www.microchip.com.

The Arduino system uses logical pin numbers to identify digital I/O pins on the connectors. The logical pin numbers for the I/O pins on the Wi-FIRE are 0-42. These pin numbers are labeled in the silk screen on the board. Additional pins 43-70 allow access to the on board components such as the uSD, MRF24 WiFi radio, User LEDs / BTNs, and POT.

Pins 0-7 and 27-33 are available on header J6 on the outer and inner row of pins, respectively. Pins 8-13 and 34-41 are available on header J5 on the outer and inner row of pins, respectively. Pin 42 is also available on the outer pin labeled "A" on the silkscreen on header J5; it is normally for the reference voltage for the microcontrollers ADC, but it can also be used as a digital I/O pin.

Analog input pins A0 through A12 are available on header J7 with A0-A5 on the outer row of pins and A6-A12 on the inner row of pins. The pins on the header J7 can also be used as digital pins rather than just analog pins 14-25 with 14-19 on the outer row of pins and 20-25 on the inner row of pins.

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In addition to the connector pin on header J5, Pin 13 also connects to the user LED LD1. Pin 43, 44, and 45 connect to user LEDs LD2, LD3, and LD4, but do not attach to any connector. Pins 46 and 47 connect to Buttons BTN1 and BTN2 and do not attach to any connector.

6 802.11b/g Interface

The 802.11b/g compatible WiFi interface on the Wi-FIRE is provided by a Microchip MRF24WG0MA WiFi module. This module provides the radio transceiver, antenna, and 802.11 compatible network firmware.

The MRF24WG0MA firmware provides the 802.11 network protocol software support. The DEIPcK and DEWFcK libraries provide the TCP/IP network protocol support that works with the 802.11 protocol support provided by the WiFi module.

The primary communications interface with the MRF24WG0MA WiFi module is a 4 wire SPI bus. This SPI bus uses SPI4 in the PIC32 microcontroller, and this SPI controller is dedicated to use for communications with the WiFi module.

The WiFi module supports SPI clock speeds up to 25MHz. In addition to the SPI interface, the interface to the WiFi module also includes a reset signal, an interrupt signal and a hibernate signal. The active low RESET signal is used to reset the WiFi module The external interrupt signal, INT, is used by the module to signal to the host microcontroller that it needs servicing by the microcontroller software. The INT signal on the WiFi module is connected to external interrupt INT4 on the PIC32 microcontroller and is not routed to any connector. The active low HIBERNATE signal is used to power the WiFi module down and puts it into a low power state.

The interface signals to the WiFi module are controlled by the network libraries and are not normally accessed by the user sketch. Refer to the schematic for the Wi-FIRE board for details on these connections.

More detailed information about the operation of the MRF24WG0MA can be obtained from the manufacturer data sheet available from www.microchip.com.

7 Network Library Software

The WiFi module on the Wi-FIRE is intended for use with the Digilent Embedded network libraries, DEIPcK and DEWFcK. The DEIPcK library provides TCP/UDP/IP protocol support for all compatible network interfaces supported by Digilent products, including the Wi-FIRE. The DEWFcK library provides the additional library support required for connecting to and operating with the Microchip MRF24WG0MA wireless network modules. Caution should be used in understanding that the DEIPcK library is different than the DNETcK network libraries. DEIPcK is the Digilent Embedded Open Source IP stack that supports both the MX and MZ processor lines, while the DNETcK IP stack is built on top of the Microchip MLA proprietary stack and only supports the MX processor line, and will not work with the Wi-FIRE.

The DEWFcK library supports the MRF24WG0MA WiFi module as loaded on the Wi-FIRE. The correct header file must be used to specify the network hardware being used by the sketch. When writing a network sketch on the Wi-FIRE, use the following hardware library:

```
#include <MRF24G.h>
```

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The Digilent Embedded network libraries are available as part of the Digilent core (Arduino IDE) download at our installing the Digilent Core guide. If you have previously installed the Digilent Network Stack as a 3rd party library, you will need to delete the Network libraries from your 3rd party sketchbook\libraries subdirectory and use the one installed with the Digilent Core (Arduino IDE). Having both libraries installed will cause compile time errors.

There are reference examples demonstrating the use of these libraries as part of the examples code downloaded with the Digilent core (Arduino IDE).

8 USB Interface

The PIC32MZ microcontroller on the Wi-FIRE contains a USB 2.0 Compliant, Hi/Full-Speed Device and On-The-Go (OTG) controller. This controller provides the following features:

- USB Hi or Full speed host and device support.
- Low speed host support.
- USB OTG support.
- Endpoint buffering anywhere in system RAM.
- Integrated DMA to access system RAM and Flash memory

Connector J12 is a standard USB type A receptacle. This connector will be used when the Wi-FIRE has been programmed to operate as a USB embedded host. The USB device is connected either directly to the Wi-FIRE, or via cable to this connector.

Connector J11, on the bottom of the board, is the Device/OTG connector. This is a standard USB micro-AB connector. Connect a cable with a micro-A plug (optionally available from Digilent) from this connector to an available USB port on a PC or USB hub for device operation.

The USB specification allows for two types of devices with regard to how they are powered: self-powered devices and bus powered devices. A self-powered device is one that is powered from a separate power supply and does not draw power from the USB bus. A bus powered device is one that draws power from the USB bus and does not have a separate power supply. The Wi-FIRE can be operated as a self-powered device or as a bus powered device from either the USB serial connector (J16) or the USB OTG/device connector (J10).

For operation as a self-powered device, place a shorting block on the EXT position of J13 and connect a suitable external power supply to either J12 or J14.

To operate the Wi-FIRE as a bus powered device powered from the USB serial connector (J16), place a shorting block in the UART position of J13. To operate as a bus powered device powered from the OTG/device connector (J10), place a shorting block in the USB position of J13.

Note that there are two completely independent USB interfaces on the Wi-FIRE board, and it is possible for the Wi-FIRE to appear as two different USB devices at the same time. These two devices can be connected to two different USB ports on the same host, or to USB ports on two different hosts. If the Wi-FIRE board is connected to two different USB hosts simultaneously, there will be a common ground connection between these two hosts through the Wi-FIRE board. In this case, it is possible for ground current to flow through the Wi-FIRE board, possibly damaging one or the other USB host if they do not share a common earth ground connection.

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When the Wi-FIRE is operating as a bus powered device using USB connector J16, it will appear as a self-powered device from the perspective of a USB host connected to J10. Similarly, when operating as a bus powered device from connector J10, it will appear as a self-powered device from the perspective of connector J16.

A USB host is expected to be able to provide bus power to USB devices connected to it. Therefore, when operating as a USB host, the Wi-FIRE should normally be externally powered. Connect a power supply to the external power connector, J15. It is possible to operate the Wi-FIRE as a USB host powered from USB connector J16; however, in this case, the host USB port will be providing power for the Wi-FIRE as well as the USB device connected to the Wi-FIRE. In this case, ensure that the total load does not exceed the 500 mA maximum load that a USB device is allowed to present to the host.

The USB host provides regulated 5 V power to the connected USB device. The internal 5 V LDO regulator can be used to provide the USB power when operating from an external power supply. Place shorting blocks on jumper block J15, as described above in the power supply section.

If the external power supply being used is a regulated 5 V supply, place a shorting block between pins VU and 5V0 on connector J15, as described above in the power supply section to bypass the on board 5.0 V regulator.

The power supply used must be able to supply enough current to power both the Wi-FIRE, and the attached USB device, since the Wi-FIRE provides power to the attached USB device when operating as a host. The USB 2.0 specification requires that the host provide at least 100 mA to the device.

Jumper JP6 is used to provide the required USB host capacitance to the host connector being used. Place the shorting block in the “A” position when using the standard USB type A (host) Connector (J11). Place the shorting block in the “AB” position for use with the USB micro-AB (OTG) connector (J10).

With JP5 shorted, Digilent pin 25 drives the enable input of a TPS2051B Current-Limited Power Distribution Switch to supply 5 V USB power to the host connector. This switch has over-current detection capability and provides an over-current fault indication by pulling the signal USBOC low. The over-current output pin can be monitored via the Digilent pin 8 (RA14/INT3) when JP4 is shorted. Details about the operation of the TPS2051B can be obtained from the data sheet available at www.ti.com.

When using the Wi-FIRE outside the Arduino IDE environment, the Microchip Harmony Library provides USB stack code that can be used with the board. There are reference designs available on the Microchip web site demonstrating both device and host operation of PIC32 microcontrollers. These reference designs can be modified for developing USB firmware for the Wi-FIRE.

9 SD Card Interface

The micro-SD card connector provides the ability to access data stored on micro-SD sized flash memory cards using the SD card library provided as part of the Arduino IDE software system.

The SD card is accessed using an SPI interface on PIC32 microcontroller pins dedicated to this purpose. The Arduino IDE SD library uses a “bit-banged” software SPI implementation to talk to SD card. However, software can be written to access the SD card using SPI3.

On the Wi-FIRE board, SPI3 and I/O pins used to communicate with the SD card are dedicated to that function and are not shared with other uses.

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10 Peripheral I/O Functions

The PIC32 microcontroller on the Wi-FIRE board provides a number of peripheral functions. The provided peripherals are explained in the following sections.

10.1 UART Ports

UART 4: Asynchronous serial port. Pin 0 (RX), Pin 1 (TX). This is accessed using the runtime object: Serial. These pins are connected to I/O connector J6 and are also connected to the FT232RQ USB serial converter. It is possible to use these pins to connect to an external serial device when not using the FT232RQ USB serial interface. This uses UART4 (U4RX, U4TX) on the PIC32 microcontroller.

UART 1: Asynchronous serial port. Pin 39 (RX), Pin 40 (TX). This is accessed using the runtime object: Serial1. This uses UART1 (U1RX, U1TX) on the PIC32 microcontroller.

10.2 SPI

Synchronous serial port. Pin 10 (SS), Pin 11 (MOSI), Pin 12 (MISO), Pin 13 (SCK). This can be accessed using the SPI standard library. It can also be accessed using the DSPI0 object from the DSPI standard library. This uses SPI2 (SS2, SDI2, SDO2, SCK2) on the PIC32 microcontroller. These signals also appear on connector J5. Be aware that pin 13 (SCK) is shared with USER LED1, and that both LED1 and the SPI port cannot be used concurrently.

SPI1: Synchronous serial port. This is an additional SPI interface on the PIC32 microcontroller that can be assessed using the DSPI1 object from the DSPI standard library. SS1 is accessed via digital pin number 7. SDO1 is accessed via digital pin 35. SDI1 is accessed via digital pin 36. SCK1 is connected to digital pin 5.

10.3 I^2C

Synchronous serial interface. The PIC32 microcontroller shares analog pins A4 and A5 with the two I2C signals, SDA and SCL. This uses I2C4 (SDA4, SCL4) on the PIC32 microcontroller. Both SDA4 and SCL4 are accessible on connector J4.

Note: The I2C bus uses open collector drivers to allow multiple devices to drive the bus signals. This means that external pull-up resistors must be provided to supply the logic high state for the signals.

10.4 PWM

Pulse width modulated output; Pins 3 (OC1), 5 (OC2), 6 (OC3), 9 (OC4), 10 (OC9), and 11 (OC7). These can be accessed using the analogWrite() runtime function.

10.5 External Interrupts

Pin 3 (INT0), Pin 2 (INT1), Pin 7 (INT2), Pin 8 (INT3), Pin 59 (INT4). Note that the pin numbers for INT0 and INT4 are different than on some other Digilent boards. INT4 is dedicated for use with the MRF24WG0MA WiFi module and is not brought out to a connector pin.

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10.6 User LEDs

Pin 13 (LD1), Pin 43 (LD2), Pin 44 (LD3), Pin 45 (LD4). Pin 13 is shared between a connector pin and the LED. Pin 43, 44, and 45 only goes to the LED and are not brought out to any connector pin. Driving the pin HIGH turns the LED on, driving it LOW turns it off.

10.7 User Push Buttons

There are two push button switches, which are labeled BTN1 (pin 46), and BTN2 (pin 47). The digitalRead() function will return LOW if the button is not pressed and HIGH when the button is pressed.

10.8 A/D Converter Reference

Labeled A, the left-most outer pin on connector J5. This is used to provide an external voltage reference to determine the input voltage range of the analog pins. The maximum voltage that can be applied to this pin is 3.3 V. This pin can also be used as digital pin 42.

10.9 Potentiometer

A potentiometer (pot) is provided on the board to be used as an analog signal source or analog control input. The pot is a 10 kΩ trimmer pot connected between the VCC3V3 supply and ground. The wiper of the pot is connected to analog input A12 or Digilent pin 48. The pot is read using the analogRead() function.

10.10 VU Voltage Monitor

The supply voltage as provided by J13 can be monitored on analog input A13 or digital pin 49. The voltage presented to the analog input is 1/11th of the actual VU voltage. This allows for a supply voltage between 2.2 V to 30 V to be monitored and still fall within the range of 0 to 3.3 V on the analog input. By doing an analogRead(49), the supply voltage can be monitored.

10.11 RTCC

The PIC32 microcontroller contains an RTCC circuit that can be used to maintain time and date information. The operation of the RTCC requires a 32.768 kHhz frequency source. Crystal X1 (not loaded), just above and to the right of the PIC32 microcontroller IC, is provided for you to solder a 32 kHhz watch crystal. The Citizen CFS206-32.768KDZF-UB crystal can be used in this location.

UPDATE: At this time, the PIC32MZ processor does not support crystals as a source for the secondary clock and an oscillator must be used. The unloaded circuit as provided may not be usable for an RTCCsource.

10.12 RESET

The PIC32 microcontroller is reset by bringing its MCLR pin low. The MCLR pin is connected to the RST pin, as presented on J1.

As previously described earlier, reset of the PIC32 microcontroller can be initiated by the USB serial converter. The USB serial converter brings the DTR pin low to reset the microcontroller. Jumper JP7 can be used to enable/disable the ability for the USB serial converter to initiate a reset.

The RST is connected to pin 3 of connector J1. This allows circuitry on a shield to reset the microcontroller, or to ensure that the circuitry on the shield is reset at the same time as the microcontroller.

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Connector J8 provides access to the SPI bus. Pin 5 provides access to the SPI Slave Select signal (SS).

On Arduino boards, the corresponding connector is also used as an in-system programming connector as well as providing access to some of the SPI signals. On Arduino boards, pin 5 of this connector is connected to the reset net.

Some Arduino shields, most notably the Ethernet shield, connect pin 5 on J8 to the reset net on pin 3 of connector J1. This causes the processor to be reset each time an attempt is made to access the SPI port. Jumper JP3 can be used to break the connection between J8 pin 5 and reset when using Arduino shields that make this connection. JP3 has a cuttable trace on the top of the board that can be cut to break the connection between SPI SS and reset. JP3 is not loaded at the factory. To restore the connection, solder a two pin header at the JP3 position and install a shorting block.

A reset button is located to the right of the MRF24WG0MA WiFi module. Pressing this button resets the PIC32 microcontroller.

11 Microchip Development Tool Compatibility

In addition to being used with the Arduino IDE, the Wi-FIRE board can be used as a more traditional microcontroller development board using Microchip Development Tools.

Unloaded connector JP2 on the right side of the MRF24WG0MA WiFi module is used to connect to a Microchip development tool, such as the PICkit™3. The holes for JP2 are staggered so that a standard 100-mil spaced 6-pin header can fit to the board without the need to solder it in place. Any Microchip development tool that supports the PIC32MZ microcontroller family, and that can be connected via the same 6-pin ICSP interface as the PICkit™3, can be used.

Typically, a standard male connector and a 6-pin cable is used with JP2 so that a PICkit™3 can be attached to the Wi-FIRE board.

The chipKIT PGM can also be used in place of a PICkit3 to program the Wi-FIRE with the Microchip Development tools. The chipKIT PGM has a smaller form factor and does not need a 6-pin cable to connect to JP2.

The Microchip MPLAB ®X IDE can be used to program and debug code running on the Wi-FIRE board. The MPLAB ®X IDE can be downloaded from the Microchip web site. Please note that Microchip's MPLAB® V8 and earlier IDEs cannot be used with the Wi-FIRE, as those versions of MPLAB® IDE do not support the MZ processor.

Using the Microchip development tools to program the Wi-FIRE board will cause the boot loader to be erased. To use the board with the Arduino IDE again, it is necessary to program the boot loader back onto the board. The boot loader HEX file can be found at on the Wi-FIRE Resource Center. To reprogram the bootloader, use the Microchip IPE which comes with the MPLAB ®X tool set. The bootloader cannot be easily reprogrammed directly with the MPLAB ®X IDE.

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12 Programming and Debugging with OpenOCD through the EJTAG/Trace Connector

OpenOCD (Open On-Chip Debugger) is a system that provides debugging, in-system programming, and boundary-scan testing for embedded target devices. For the Wi-FIRE, users may use the OpenOCD directly with the Wi-FIRE through the primary programming UART port.

Header J17 provides a EJTAG header where users may attach a debugging adapter such as the Bus Blaster v3C to use with OpenOCD.

More information on how to use OpenOCD Debug with the Wi-FIRE can be found via MIPS Debug OpenOCD with Bus Blaster Getting Started Guide available on the Imagination Technologies website. An OpenOCD Installer that provides CodeScape SDK and all of the support files for the Wi-FIRE is available on the MIPS website here.

13 Pinout Tables

The following tables show the relationship between the digital pin numbers, the connector pin numbers, and the microcontroller pin numbers.

In the following tables, columns labeled Digilent pin # refer to the digital pin number. This is the value that is passed to the pinMode(), digitalRead(), digitalWrite() and other functions which refer to the pin.

13.1 Pinout Table by Digilent Pin Number

Digilent Pin #	MCU Pin	Port Bit	PIC32 Signal Name	Function
0	57	RF02	EBIRDY3/RPF2/SDA3/RF2	GPIO, U4RX
1	58	RF08	EBIRDY2/RPF8/SCL3/RF8	GPIO, U4TX
2	18	RE08	AN25/AERXD0/RPE8/RE8	GPIO, IC1, INT1
3	71	RD00	EMDIO/AEMDIO/RPD0/RTCC/INT0/RD0	PWM 1, INT0, OC1
4	60	RA03	EBIRDY1/SDA2/RA3	GPIO
5	76	RD01	RPD1/SCK1/RD1	PWM 2, OC2
6	77	RD02	EBID14/ETXEN/RPD2/PMD14/RD2	PWM 3, OC3
7	19	RE09	AN26/AERXD1/RPE9/RE9	GPIO, IC2, INT2
8	66	RA14	AETXCLK/RPA14/SCL1/RA14	GPIO, IC3, INT3
9	78	RD03	EBID15/ETXCLK/RPD3/PMD15/RD3	PWM 4, OC4
10	16	RG09	EBIA2/AN11/C2INC/ERXCLK/EREFCLK/AERXCLK/AEREF CLK/RPG9/PMA2/RG9	SPI_SS2, PWM 5, OC9, IC6
11	70	RD11	EMDC/AEMDC/RPD11/RD11	SPI_SDO2/SDI2 PWM 6, OC7
12	85	RF00	EBID11/ETXD1/RPF0/PMD11/RF0	SPI_SDI2/SDO2, T5CK(+)
13	10	RG06	AN14/C1IND/ECOL/RPG6/SCK2/RG6	SPI_SCK2, USER LED1
14	20	RB05	AN45/C1INA/RPB5/RB5	AIN0, GPIO

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Digilent Pin #	MCU Pin	Port Bit	PIC32 Signal Name	Function
15	33	RB09	EBIA7/AN49/RPB9/PMA7/RB9	AIN1, GPIO
16	7	RC02	EBIA12/AN21/RPC2/PMA12/RC2	AIN2, GPIO
17	44	RB15	EBIA0/AN10/ERXD3/AETXD2/RPB15/OCFB/PMA0/RB15	AIN3, GPIO
18	11	RG07	EBIA4/AN13/C1INC/ECRS/RPG7/SDA4/PMA4/RG7	AIN4, SDA
19	12	RG08	EBIA3/AN12/C2IND/ERXDV/ECRSDV/AERXDV/AECRSDV/RPG8/SCL4/PMA3/RG8	AIN5, SCL
20	22	RB03	AN3/C2INA/RPB3/RB3	AIN6, GPIO
21	23	RB02	AN2/C2INB/RPB2/RB2	AIN7, GPIO
22	21	RB04	AN4/C1INB/RB4	AIN8, GPIO
23	24	RB01	PGEC1/AN1/RPB1/RB1	AIN9, GPIO
24	32	RB08	EBIA10/AN48/RPB8/PMA10/RB8	AIN10, GPIO
25	25	RB00	PGED1/AN0/RPB0/RB0	AIN11, GPIO, P32_VBUSON
26	91	RE00	EBID0/PMD0/RE0	GPIO
27	94	RE01	EBID1/PMD1/RE1	GPIO
28	98	RE02	EBID2/PMD2/RE2	GPIO
29	99	RE03	EBID3/RPE3/PMD3/RE3	GPIO
30	100	RE04	EBID4/AN18/PMD4/RE4	GPIO
31	3	RE05	EBID5/AN17/RPE5/PMD5/RE5	GPIO
32	4	RE06	EBID6/AN16/PMD6/RE6	GPIO
33	5	RE07	EBID7/AN15/PMD7/RE7	GPIO
34	82	RD05	SQICS1/RPD5/RD5	GPIO, T4CK
35	6	RC01	EBIA6/AN22/RPC1/PMA6/RC1	GPIO, T2CK, IC7
36	86	RF01	EBID10/ETXD0/RPF1/PMD10/RF1	GPIO, T6CK
37	59	RA02	EBICS0/SCL2/RA2	GPIO
38	79	RD12	EBID12/ETXD2/RPD12/PMD12/RD12	GPIO, T3Ck
39	47	RD14	AN32/AETXD0/RPD14/RD14	GPIO, U1RX
40	48	RD15	AN33/AETXD1/RPD15/SCK6/RD15	GPIO, U1TX
41	28	RA09	VREF-/CVREF-/AN27/AERXD2/RA9	GPIO, VREF-
42	29	RA10	VREF+/CVREF+/AN28/AERXD3/RA10	VREF+
43	81	RD04	SQICS0/RPD4/RD4	USER_LED2
44	35	RB11	AN6/ERXERR/AETXERR/RB11	USER_LED3
45	1	RG15	AN23/AERXERR/RG15	USER_LED4
46	2	RA05	EBIA5/AN34/PMA5/RA5	BTN1
47	61	RA04	EBIA14/PMCS1/PMA14/RA4	BTN2

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Digilent Pin #	MCU Pin	Port Bit	PIC32 Signal Name	Function
48	42	RB13	AN8/ERXD1/AECOL/RB13	AIN12/POT
49	41	RB12	EBIA11/AN7/ERXD0/AECRS/PMA11/RB12	AIN13/POWER SUPPLY MONITOR
50	80	RD13	EBID13/ETXD3/PMD13/RD13	5V POWER ENABLE
51	43	RB14	EBIA1/AN9/ERXD2/AETXD3/RPB14/SCK3/PMA1/RB14	SD_SCK3
52	8	RC03	EBIWE/AN20/RPC3/PMWR/RC3	SD_SS3
53	34	RB10	EBIA13/CVREFOUT/AN5/RPB10/PMA13/RB10	SD_SDI3
54	9	RC04	EBIOE/AN19/RPC4/PMRD/RC4	SD_SDO3
55	69	RD10	RPD10/SCK4/RD10	MRF24_SCK4
56	68	RD09	EBIA15/RPD9/PMCS2/PMA15/RD9	MRF24_SS4
57	65	RF05	EBIA8/RPF5/SCL5/PMA8/RF5	MRF24_SDI4
58	88	RG00	EBID8/RPG0/PMD8/RG0	MRF24 SDO4
59	67	RA15	AETXEN/RPA15/SDA1/RA15	MRF24_INT4
60	87	RG01	EBID9/ETXERR/RPG1/PMD9/RG1	MRF24_HIBERNATE
61	64	RF04	EBIA9/RPF4/SDA5/PMA9/RF4	MRF24_RESET
62	38	RA01	TCK/EBIA19/AN29/RA1	TCK
63	17	RA00	TMS/EBIA16/AN24/RA0	TMS
64	40	RF12	TDO/EBIA17/AN31/RPF12/RF12	TDO
65	39	RF13	TDI/EBIA18/AN30/RPF13/SCK5/RF13	TDI
66	89	RA06	TRCLK/SQICLK/RA6	TRCLK
67	97	RG13	TRD0/SQID0/RG13	TRD0
68	96	RG12	TRD1/SQID1/RG12	TRD1
69	95	RG14	TRD2/SQID2/RG14	TRD2
70	90	RA07	TRD3/SQID3/RA7	TRD3
N/A	13		VSS	POWER
N/A	14		VDD	POWER
N/A	15		MCLR	MCLR, ICSP
N/A	26	RB06	PGEC2/AN46/RPB6/RB6	ICSP
N/A	27	RB07	PGED2/AN47/RPB7/RB7	ICSP
N/A	30		AVDD	POWER
N/A	31		AVSS	POWER
N/A	36		VSS	POWER
N/A	37		VDD	POWER
N/A	45		VSS	POWER
N/A	46		VDD	POWER

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Digilent Pin #	MCU Pin	Port Bit	PIC32 Signal Name	Function
N/A	49	RC12	OSCI/CLKI/RC12	XTAL
N/A	50	RC15	OSCO/CLKO/RC15	XTAL
N/A	51		VBUS	POWER
N/A	52		VUSB3V3	POWER
N/A	53		VSS	POWER
N/A	54		D-	PIC32_USBD-
N/A	55		D+	PIC32_USBD+
N/A	56	RF03	USBID/RPF3/RF3	PIC32_USBID
N/A	62		VDD	POWER
N/A	63		VSS	POWER
N/A	72	RC13	SOSCI/RPC13/RC13	SOSC XTAL
N/A	73	RC14	SOSCO/RPC14/T1CK/RC14	SOSC XTAL
N/A	74		VDD	POWER
N/A	75		VSS	POWER
N/A	83		VDD	POWER
N/A	84		VSS	POWER
N/A	92		VSS	POWER
N/A	93	RF02	VDD	POWER

13.2 Pinout Table by MCU Pin and Port Bit Numbers

Port Bit	Digilent Pin #	MCU Pin	PIC32 Signal Name	Function
RA00	63	17	TMS/EBIA16/AN24/RA0	TMS
RA01	62	38	TCK/EBIA19/AN29/RA1	TCK
RA02	37	59	EBICS0/SCL2/RA2	GPIO
RA03	4	60	EBIRDY1/SDA2/RA3	GPIO
RA04	47	61	EBIA14/PMCS1/PMA14/RA4	BTN2
RA05	46	2	EBIA5/AN34/PMA5/RA5	BTN1
RA06	66	89	TRCLK/SQICLK/RA6	TRCLK
RA07	70	90	TRD3/SQID3/RA7	TRD3
RA09	41	28	VREF-/CVREF-/AN27/AERXD2/RA9	GPIO, VREF-
RA10	42	29	VREF+/CVREF+/AN28/AERXD3/RA10	VREF+
RA14	8	66	AETXCLK/RPA14/SCL1/RA14	GPIO, IC3, INT3
RA15	59	67	AETXEN/RPA15/SDA1/RA15	MRF24_INT4

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Port Bit	Digilent Pin #	MCU Pin	PIC32 Signal Name	Function
RB00	25	25	PGED1/AN0/RPB0/RB0	AIN11, GPIO, P32_VBUSON
RB01	23	24	PGEC1/AN1/RPB1/RB1	AIN9, GPIO
RB02	21	23	AN2/C2INB/RPB2/RB2	AIN7, GPIO
RB03	20	22	AN3/C2INA/RPB3/RB3	AIN6, GPIO
RB04	22	21	AN4/C1INB/RB4	AIN8, GPIO
RB05	14	20	AN45/C1INA/RPB5/RB5	AIN0, GPIO
RB06	N/A	26	PGEC2/AN46/RPB6/RB6	ICSP
RB07	N/A	27	PGED2/AN47/RPB7/RB7	ICSP
RB08	24	32	EBIA10/AN48/RPB8/PMA10/RB8	AIN10, GPIO
RB09	15	33	EBIA7/AN49/RPB9/PMA7/RB9	AIN1, GPIO
RB10	53	34	EBIA13/CVREFOUT/AN5/RPB10/PMA13/RB10	SD_SDI3
RB11	44	35	AN6/ERXERR/AETXERR/RB11	USER_LED3
RB12	49	41	EBIA11/AN7/ERXD0/AECRS/PMA11/RB12	AIN13/POWER SUPPLY MONITOR
RB13	48	42	AN8/ERXD1/AECOL/RB13	AIN12/POT
RB14	51	43	EBIA1/AN9/ERXD2/AETXD3/RPB14/SCK3/PMA1/RB14	SD_SCK3
RB15	17	44	EBIA0/AN10/ERXD3/AETXD2/RPB15/OCFB/PMA0/RB15	AIN3, GPIO
RC01	35	6	EBIA6/AN22/RPC1/PMA6/RC1	GPIO, T2CK, IC7
RC02	16	7	EBIA12/AN21/RPC2/PMA12/RC2	AIN2, GPIO
RC03	52	8	EBIWE/AN20/RPC3/PMWR/RC3	SD_SS3
RC04	54	9	EBIOE/AN19/RPC4/PMRD/RC4	SD_SDO3
RC12	N/A	49	OSCI/CLKI/RC12	XTAL
RC13	N/A	72	SOSCI/RPC13/RC13	SOSC XTAL
RC14	N/A	73	SOSCO/RPC14/T1CK/RC14	SOSC XTAL
RC15	N/A	50	OSCO/CLKO/RC15	XTAL
RD00	3	71	EMDIO/AEMDIO/RPD0/RTCC/INT0/RD0	PWM 1, INT0, OC1
RD01	5	76	RPD1/SCK1/RD1	PWM 2, OC2
RD02	6	77	EBID14/ETXEN/RPD2/PMD14/RD2	PWM 3, OC3
RD03	9	78	EBID15/ETXCLK/RPD3/PMD15/RD3	PWM 4, OC4
RD04	43	81	SQICS0/RPD4/RD4	USER_LED2
RD05	34	82	SQICS1/RPD5/RD5	GPIO, T4CK
RD09	56	68	EBIA15/RPD9/PMCS2/PMA15/RD9	MRF24_SS4
RD10	55	69	RPD10/SCK4/RD10	MRF24_SCK4
RD11	11	70	EMDC/AEMDC/RPD11/RD11	SPI_SDO2/SDI2 PWM 6, OC7

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Port Bit	Digilent Pin #	MCU Pin	PIC32 Signal Name	Function
RD12	38	79	EBID12/ETXD2/RPD12/PMD12/RD12	GPIO, T3Ck
RD13	50	80	EBID13/ETXD3/PMD13/RD13	5V POWER ENABLE
RD14	39	47	AN32/AETXD0/RPD14/RD14	GPIO, U1RX
RD15	40	48	AN33/AETXD1/RPD15/SCK6/RD15	GPIO, U1TX
RE00	26	91	EBID0/PMD0/RE0	GPIO
RE01	27	94	EBID1/PMD1/RE1	GPIO
RE02	28	98	EBID2/PMD2/RE2	GPIO
RE03	29	99	EBID3/RPE3/PMD3/RE3	GPIO
RE04	30	100	EBID4/AN18/PMD4/RE4	GPIO
RE05	31	3	EBID5/AN17/RPE5/PMD5/RE5	GPIO
RE06	32	4	EBID6/AN16/PMD6/RE6	GPIO
RE07	33	5	EBID7/AN15/PMD7/RE7	GPIO
RE08	2	18	AN25/AERXD0/RPE8/RE8	GPIO, IC1, INT1
RE09	7	19	AN26/AERXD1/RPE9/RE9	GPIO, IC2, INT2
RF00	12	85	EBID11/ETXD1/RPF0/PMD11/RF0	SPI_SDI2/SDO2, T5CK(+)
RF01	36	86	EBID10/ETXD0/RPF1/PMD10/RF1	GPIO, T6CK
RF02	0	57	EBIRDY3/RPF2/SDA3/RF2	GPIO, U4RX
RF03	N/A	56	USBID/RPF3/RF3	PIC32_USBID
RF04	61	64	EBIA9/RPF4/SDA5/PMA9/RF4	MRF24_RESET
RF05	57	65	EBIA8/RPF5/SCL5/PMA8/RF5	MRF24_SDI4
RF08	1	58	EBIRDY2/RPF8/SCL3/RF8	GPIO, U4TX
RF12	64	40	TDO/EBIA17/AN31/RPF12/RF12	TDO
RF13	65	39	TDI/EBIA18/AN30/RPF13/SCK5/RF13	TDI
RG00	58	88	EBID8/RPG0/PMD8/RG0	MRF24 SDO4
RG01	60	87	EBID9/ETXERR/RPG1/PMD9/RG1	MRF24_HIBERNATE
RG06	13	10	AN14/C1IND/ECOL/RPG6/SCK2/RG6	SPI_SCK2, USER LED1
RG07	18	11	EBIA4/AN13/C1INC/ECRS/RPG7/SDA4/PMA4/RG7	AIN4, SDA
RG08	19	12	EBIA3/AN12/C2IND/ERXDV/ECRSDV/AERXDV/AECRSDV/RPG8/SCL4/PMA3/RG8	AIN5, SCL
RG09	10	16	EBIA2/AN11/C2INC/ERXCLK/EREFCLK/AERXCLK/AEREFCLK/RPG9/PMA2/RG9	SPI_SS2, PWM 5, OC9, IC6
RG12	68	96	TRD1/SQID1/RG12	TRD1
RG13	67	97	TRD0/SQID0/RG13	TRD0
RG14	69	95	TRD2/SQID2/RG14	TRD2
RG15	45	1	AN23/AERXERR/RG15	USER_LED4
	N/A	13	VSS	POWER

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Port Bit	Digilent Pin #	MCU Pin	PIC32 Signal Name	Function
	N/A	14	VDD	POWER
	N/A	15	MCLR	MCLR, ICSP
	N/A	30	AVDD	POWER
	N/A	31	AVSS	POWER
	N/A	36	VSS	POWER
	N/A	37	VDD	POWER
	N/A	45	VSS	POWER
	N/A	46	VDD	POWER
	N/A	51	VBUS	POWER
	N/A	52	VUSB3V3	POWER
	N/A	53	VSS	POWER
	N/A	54	D-	PIC32_USBD-
	N/A	55	D+	PIC32_USBD+
	N/A	62	VDD	POWER
	N/A	63	VSS	POWER
	N/A	74	VDD	POWER
	N/A	75	VSS	POWER
	N/A	83	VDD	POWER
	N/A	84	VSS	POWER
	N/A	92	VSS	POWER
	N/A	93	VDD	POWER

13.3 Pinout Table by PIC32 Microcontroller Pin

MCU Pin	Port Bit	Digilent Pin #	PIC32 Signal Name	Function
1	RG15	45	AN23/AERXERR/RG15	USER_LED4
2	RA05	46	EBIA5/AN34/PMA5/RA5	BTN1
3	RE05	31	EBID5/AN17/RPE5/PMD5/RE5	GPIO
4	RE06	32	EBID6/AN16/PMD6/RE6	GPIO
5	RE07	33	EBID7/AN15/PMD7/RE7	GPIO
6	RC01	35	EBIA6/AN22/RPC1/PMA6/RC1	GPIO, T2CK, IC7
7	RC02	16	EBIA12/AN21/RPC2/PMA12/RC2	AIN2, GPIO
8	RC03	52	EBIWE/AN20/RPC3/PMWR/RC3	SD_SS3
9	RC04	54	EBIOE/AN19/RPC4/PMRD/RC4	SD_SDO3

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MCU Pin	Port Bit	Digilent Pin #	PIC32 Signal Name	Function
10	RG06	13	AN14/C1IND/ECOL/RPG6/SCK2/RG6	SPI_SCK2, USER LED1
11	RG07	18	EBIA4/AN13/C1INC/ECRS/RPG7/SDA4/PMA4/RG7	AIN4, SDA
12	RG08	19	EBIA3/AN12/C2IND/ERXDV/ECRSDV/AERXDV/AECRSDV/RPG8/SCL4/PMA3/RG8	AIN5, SCL
13		N/A	VSS	POWER
14		N/A	VDD	POWER
15		N/A	MCLR	MCLR, ICSP
16	RG09	10	EBIA2/AN11/C2INC/ERXCLK/EREFCLK/AERXCLK/AEREFCLK/RPG9/PMA2/RG9	SPI_SS2, PWM 5, OC9, IC6
17	RA00	63	TMS/EBIA16/AN24/RA0	TMS
18	RE08	2	AN25/AERXD0/RPE8/RE8	GPIO, IC1, INT1
19	RE09	7	AN26/AERXD1/RPE9/RE9	GPIO, IC2, INT2
20	RB05	14	AN45/C1INA/RPB5/RB5	AIN0, GPIO
21	RB04	22	AN4/C1INB/RB4	AIN8, GPIO
22	RB03	20	AN3/C2INA/RPB3/RB3	AIN6, GPIO
23	RB02	21	AN2/C2INB/RPB2/RB2	AIN7, GPIO
24	RB01	23	PGEC1/AN1/RPB1/RB1	AIN9, GPIO
25	RB00	25	PGED1/AN0/RPB0/RB0	AIN11, GPIO, P32_VBUSON
26	RB06	N/A	PGEC2/AN46/RPB6/RB6	ICSP
27	RB07	N/A	PGED2/AN47/RPB7/RB7	ICSP
28	RA09	41	VREF-/CVREF-/AN27/AERXD2/RA9	GPIO, VREF-
29	RA10	42	VREF+/CVREF+/AN28/AERXD3/RA10	VREF+
30		N/A	AVDD	POWER
31		N/A	AVSS	POWER
32	RB08	24	EBIA10/AN48/RPB8/PMA10/RB8	AIN10, GPIO
33	RB09	15	EBIA7/AN49/RPB9/PMA7/RB9	AIN1, GPIO
34	RB10	53	EBIA13/CVREFOUT/AN5/RPB10/PMA13/RB10	SD_SDI3
35	RB11	44	AN6/ERXERR/AETXERR/RB11	USER_LED3
36		N/A	VSS	POWER
37		N/A	VDD	POWER
38	RA01	62	TCK/EBIA19/AN29/RA1	TCK
39	RF13	65	TDI/EBIA18/AN30/RPF13/SCK5/RF13	TDI
40	RF12	64	TDO/EBIA17/AN31/RPF12/RF12	TDO
41	RB12	49	EBIA11/AN7/ERXD0/AECRS/PMA11/RB12	AIN13/POWER SUPPLY MONITOR
42	RB13	48	AN8/ERXD1/AECOL/RB13	AIN12/POT

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MCU Pin	Port Bit	Digilent Pin #	PIC32 Signal Name	Function
43	RB14	51	EBIA1/AN9/ERXD2/AETXD3/RPB14/SCK3/PMA1/RB14	SD_SCK3
44	RB15	17	EBIA0/AN10/ERXD3/AETXD2/RPB15/OCFB/PMA0/RB15	AIN3, GPIO
45		N/A	VSS	POWER
46		N/A	VDD	POWER
47	RD14	39	AN32/AETXD0/RPD14/RD14	GPIO, U1RX
48	RD15	40	AN33/AETXD1/RPD15/SCK6/RD15	GPIO, U1TX
49	RC12	N/A	OSCI/CLKI/RC12	XTAL
50		N/A	OSCO/CLKO/RC15	XTAL
51		N/A	VBUS	POWER
52		N/A	VUSB3V3	POWER
53		N/A	VSS	POWER
54		N/A	D-	PIC32_USBD-
55		N/A	D+	PIC32_USBD+
56	RF03	N/A	USBID/RPF3/RF3	PIC32_USBID
57	RF02	0	EBIRDY3/RPF2/SDA3/RF2	GPIO, U4RX
58	RF08	1	EBIRDY2/RPF8/SCL3/RF8	GPIO, U4TX
59	RA02	37	EBICS0/SCL2/RA2	GPIO
60	RA03	4	EBIRDY1/SDA2/RA3	GPIO
61	RA04	47	EBIA14/PMCS1/PMA14/RA4	BTN2
62		N/A	VDD	POWER
63		N/A	VSS	POWER
64	RF04	61	EBIA9/RPF4/SDA5/PMA9/RF4	MRF24_RESET
65	RF05	57	EBIA8/RPF5/SCL5/PMA8/RF5	MRF24_SDI4
66	RA14	8	AETXCLK/RPA14/SCL1/RA14	GPIO, IC3, INT3
67	RA15	59	AETXEN/RPA15/SDA1/RA15	MRF24_INT4
68	RD09	56	EBIA15/RPD9/PMCS2/PMA15/RD9	MRF24_SS4
69	RD10	55	RPD10/SCK4/RD10	MRF24_SCK4
70	RD11	11	EMDC/AEMDC/RPD11/RD11	SPI_SDO2/SDI2 PWM 6, OC7
71	RD00	3	EMDIO/AEMDIO/RPD0/RTCC/INT0/RD0	PWM 1, INT0, OC1
72	RC13	N/A	SOSCI/RPC13/RC13	SOSC XTAL
73	RC14	N/A	SOSCO/RPC14/T1CK/RC14	SOSC XTAL
74		N/A	VDD	POWER
75		N/A	VSS	POWER

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MCU Pin	Port Bit	Digilent Pin #	PIC32 Signal Name	Function
76	RD01	5	RPD1/SCK1/RD1	PWM 2, OC2
77	RD02	6	EBID14/ETXEN/RPD2/PMD14/RD2	PWM 3, OC3
78	RD03	9	EBID15/ETXCLK/RPD3/PMD15/RD3	PWM 4, OC4
79	RD12	38	EBID12/ETXD2/RPD12/PMD12/RD12	GPIO, T3Ck
80	RD13	50	EBID13/ETXD3/PMD13/RD13	5V POWER ENABLE
81	RD04	43	SQICS0/RPD4/RD4	USER_LED2
82	RD05	34	SQICS1/RPD5/RD5	GPIO, T4CK
83		N/A	VDD	POWER
84		N/A	VSS	POWER
85	RF00	12	EBID11/ETXD1/RPF0/PMD11/RF0	SPI_SDI2/SDO2, T5CK(+)
86	RF01	36	EBID10/ETXD0/RPF1/PMD10/RF1	GPIO, T6CK
87	RG01	60	EBID9/ETXERR/RPG1/PMD9/RG1	MRF24_HIBERNATE
88	RG00	58	EBID8/RPG0/PMD8/RG0	MRF24 SDO4
89	RA06	66	TRCLK/SQICLK/RA6	TRCLK
90	RA07	70	TRD3/SQID3/RA7	TRD3
91	RE00	26	EBID0/PMD0/RE0	GPIO
92		N/A	VSS	POWER
93		N/A	VDD	POWER
94	RE01	27	EBID1/PMD1/RE1	GPIO
95	RG14	69	TRD2/SQID2/RG14	TRD2
96	RG12	68	TRD1/SQID1/RG12	TRD1
97	RG13	67	TRD0/SQID0/RG13	TRD0
98	RE02	28	EBID2/PMD2/RE2	GPIO
99	RE03	29	EBID3/RPE3/PMD3/RE3	GPIO
100	RE04	30	EBID4/AN18/PMD4/RE4	GPIO

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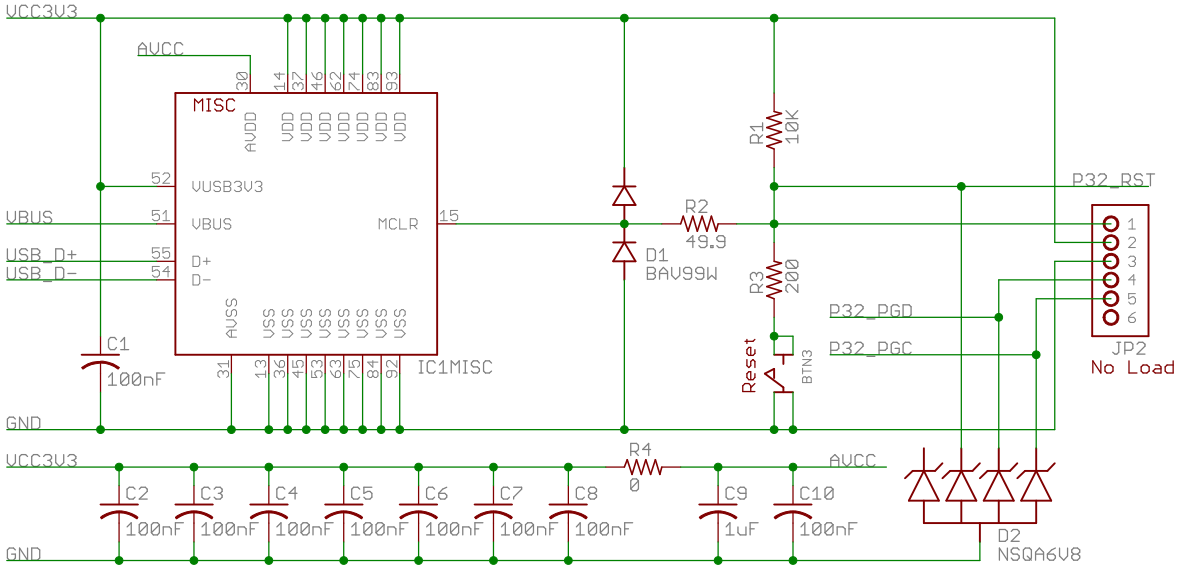

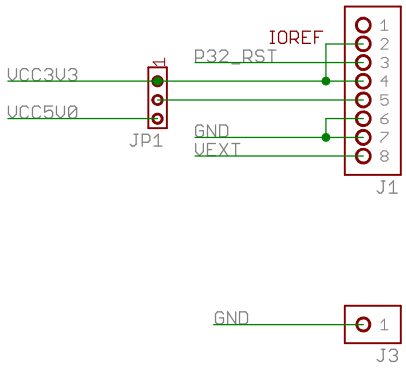

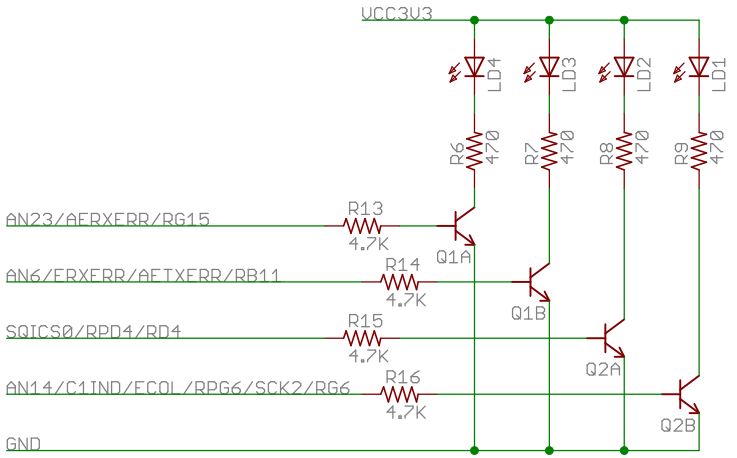

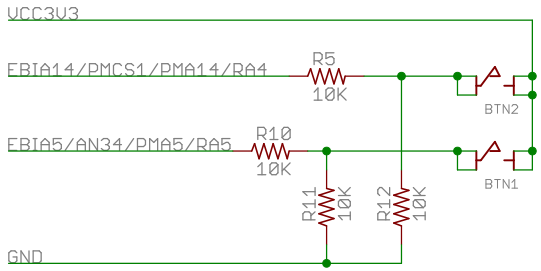

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SHEET: ICSP, USB Serial, BTNs, LEDs		Author: GMA
TITLE: WiFIRE		Rev: D.0
Doc#: 500-302	Date: 7/21/2016	Sheet: 1/7

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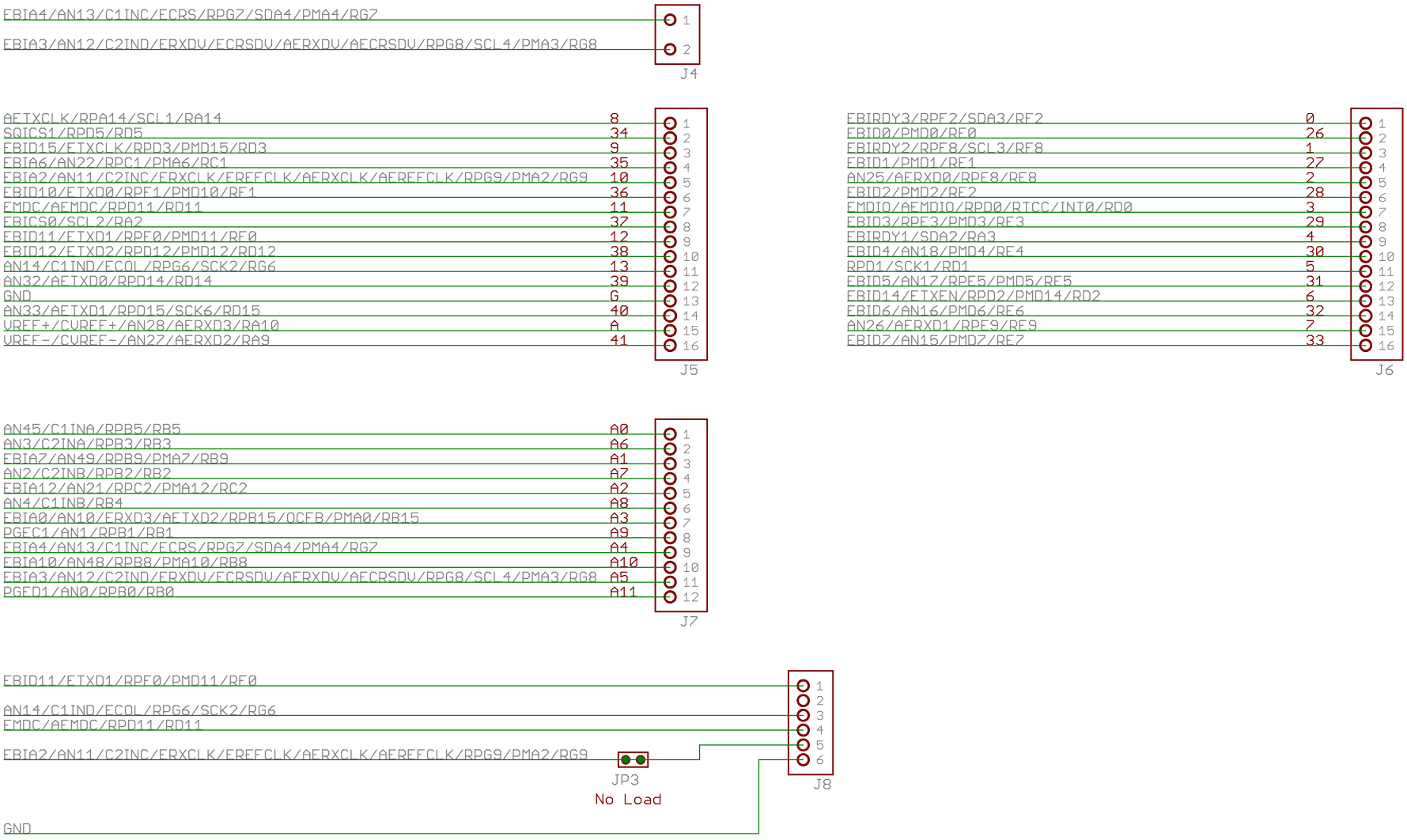
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EBIA3/AN12/C2IND/ERXDV/ECRSDV/AERXDV/AECRSDV/RPG8/SCL4/PMA3/RG8
J4
AETXCLK/RPA14/SCL1/RA14 8
SQICS1/RPD5/RD5 34
EBID15/ETXCLK/RPD3/PMD15/RD3 9
EBIA6/AN22/RPC1/PMA6/RC1 35
EBIA2/AN11/C2INC/ERXCLK/EREFCLK/AERXCLK/AEREFCLK/RPG9/PMA2/RG9 10
EBID10/ETXD0/RPF1/PMD10/RF1 36
EMDC/AEMDC/RPD11/RD11 11
EBICS0/SCL2/RA2 37
EBID11/ETXD1/RPF0/PMD11/RF0 12
EBID12/ETXD2/RPD12/PMD12/RD12 38
AN14/C1IND/ECOL/RPG6/SCK2/RG6 13
AN32/AETXD0/RPD14/RD14 39
GND G
AN33/AETXD1/RPD15/SCK6/RD15 40
VREF+/CVREF+/AN28/AERXD3/RA10 A
VREF-/CVREF-/AN27/AERXD2/RA9 41
J5
EBIRDY3/RPF2/SDA3/RF2 0
EBID0/PMD0/RE0 26
EBIRDY2/RPF8/SCL3/RF8 1
EBID1/PMD1/RE1 27
AN25/AERXD0/RPE8/RE8 2
EBID2/PMD2/RE2 28
EMDIO/AEMDIO/RPD0/RTCC/INT0/RD0 3
EBID3/RPE3/PMD3/RE3 29
EBIRDY1/SDA2/RA3 4
EBID4/AN18/PMD4/RE4 30
RPD1/SCK1/RD1 5
EBID5/AN17/RPE5/PMD5/RE5 31
EBID14/ETXEN/RPD2/PMD14/RD2 6
EBID6/AN16/PMD6/RE6 32
AN26/AERXD1/RPE9/RE9 7
EBID7/AN15/PMD7/RE7 33
J6
AN45/C1INA/RPB5/RB5 A0
AN3/C2INA/RPB3/RB3 A6
EBIA7/AN49/RPB9/PMA7/RB9 A1
AN2/C2INB/RPB2/RB2 A7
EBIA12/AN21/RPC2/PMA12/RC2 A2
AN4/C1INB/RB4 A8
EBIA0/AN10/ERXD3/AETXD2/RPB15/OCFB/PMA0/RB15 A3
PGEC1/AN1/RPB1/RB1 A9
EBIA4/AN13/C1INC/ECRS/RPG7/SDA4/PMA4/RG7 A4
EBIA10/AN48/RPB8/PMA10/RB8 A10
EBIA3/AN12/C2IND/ERXDV/ECRSDV/AERXDV/AECRSDV/RPG8/SCL4/PMA3/RG8 A5
PGED1/AN0/RPB0/RB0 A11
J7
EBID11/ETXD1/RPF0/PMD11/RF0
AN14/C1IND/ECOL/RPG6/SCK2/RG6
EMDC/AEMDC/RPD11/RD11
EBIA2/AN11/C2INC/ERXCLK/EREFCLK/AERXCLK/AEREFCLK/RPG9/PMA2/RG9
JP3
No Load
GND
J8
WiFIRE
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Engineer: KRV
SHEET: chipKit I/O connectors
Author: GMA
TITLE: WiFIRE
Rev: D.0
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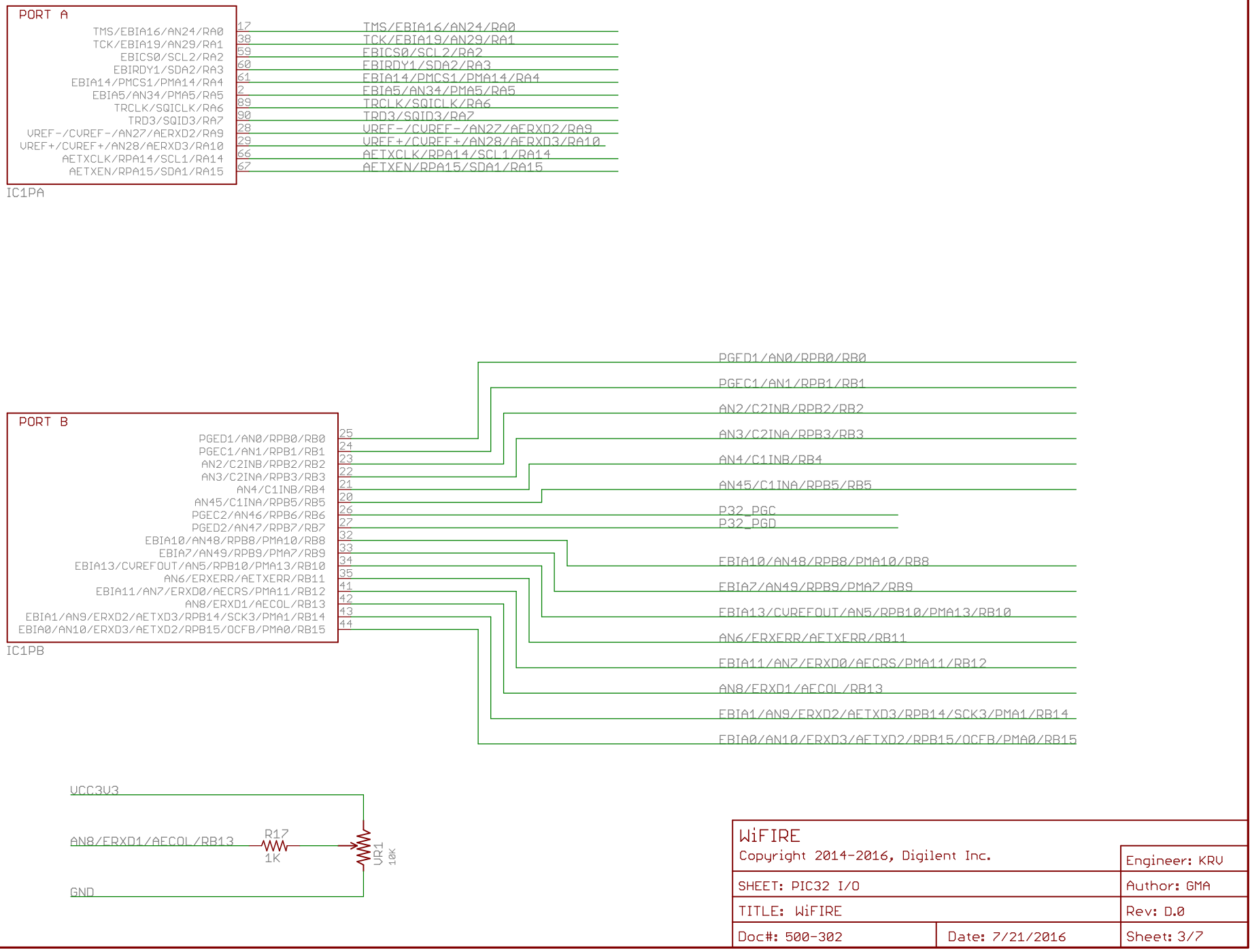
PORT A
TMS/EBIA16/AN24/RA0
TCK/EBIA19/AN29/RA1
EBICS0/SCL2/RA2
EBIRDY1/SDA2/RA3
EBIA14/PMCS1/PMA14/RA4
EBIA5/AN34/PMA5/RA5
TRCLK/SQICLK/RA6
TRD3/SQID3/RA7
VREF-/CVREF-/AN27/AERXD2/RA9
VREF+/CVREF+/AN28/AERXD3/RA10
AETXCLK/RPA14/SCL1/RA14
AETXEN/RPA15/SDA1/RA15
17
38
59
60
61
2
89
90
28
29
66
67
TMS/EBIA16/AN24/RA0
TCK/EBIA19/AN29/RA1
EBICS0/SCL2/RA2
EBIRDY1/SDA2/RA3
EBIA14/PMCS1/PMA14/RA4
EBIA5/AN34/PMA5/RA5
TRCLK/SQICLK/RA6
TRD3/SQID3/RA7
VREF-/CVREF-/AN27/AERXD2/RA9
VREF+/CVREF+/AN28/AERXD3/RA10
AETXCLK/RPA14/SCL1/RA14
AETXEN/RPA15/SDA1/RA15
IC1PA
PORT B
PGED1/AN0/RPB0/RB0
PGEC1/AN1/RPB1/RB1
AN2/C2INB/RPB2/RB2
AN3/C2INA/RPB3/RB3
AN4/C1INB/RB4
AN45/C1INA/RPB5/RB5
PGEC2/AN46/RPB6/RB6
PGED2/AN47/RPB7/RB7
EBIA10/AN48/RPB8/PMA10/RB8
EBIA7/AN49/RPB9/PMA7/RB9
EBIA13/CVREFOUT/AN5/RPB10/PMA13/RB10
AN6/ERXERR/AETXERR/RB11
EBIA11/AN7/ERXD0/AECRS/PMA11/RB12
AN8/ERXD1/AECOL/RB13
EBIA1/AN9/ERXD2/AETXD3/RPB14/SCK3/PMA1/RB14
EBIA0/AN10/ERXD3/AETXD2/RPB15/OCFB/PMA0/RB15
25
24
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34
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42
43
44
PGED1/AN0/RPB0/RB0
PGEC1/AN1/RPB1/RB1
AN2/C2INB/RPB2/RB2
AN3/C2INA/RPB3/RB3
AN4/C1INB/RB4
AN45/C1INA/RPB5/RB5
P32_PGC
P32_PGD
EBIA10/AN48/RPB8/PMA10/RB8
EBIA7/AN49/RPB9/PMA7/RB9
EBIA13/CVREFOUT/AN5/RPB10/PMA13/RB10
AN6/ERXERR/AETXERR/RB11
EBIA11/AN7/ERXD0/AECRS/PMA11/RB12
AN8/ERXD1/AECOL/RB13
EBIA1/AN9/ERXD2/AETXD3/RPB14/SCK3/PMA1/RB14
EBIA0/AN10/ERXD3/AETXD2/RPB15/OCFB/PMA0/RB15
IC1PB
VCC3V3
AN8/ERXD1/AECOL/RB13
R17
1K
VR1
10K
GND
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Engineer: KRV
SHEET: PIC32 I/O
Author: GMA
TITLE: WiFIRE
Rev: D.0
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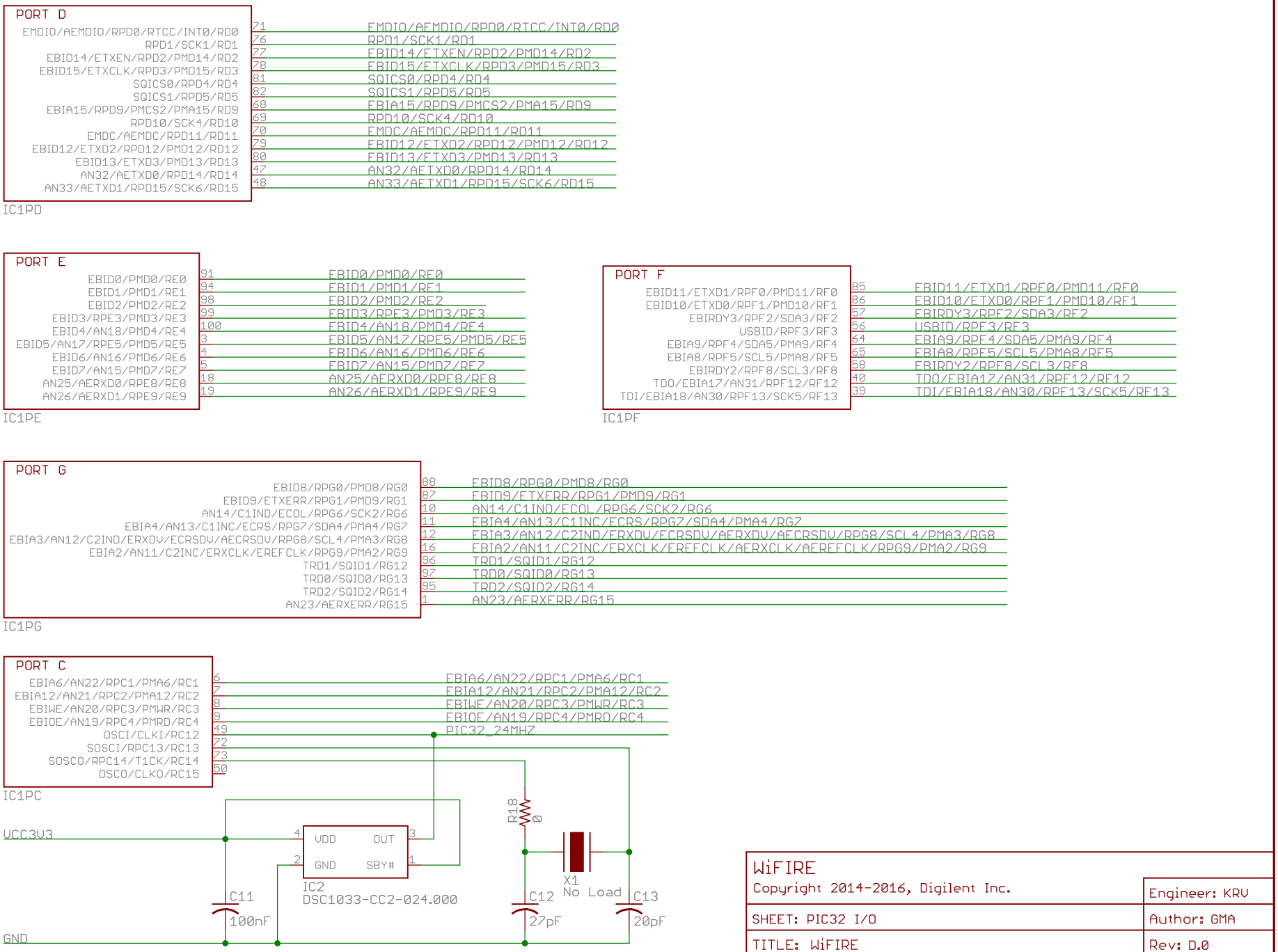
Sheet: 3/7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EMDIO/AEMDIO/RPD0/RTCC/INT0/RD0
RPD1/SCK1/RD1
EBID14/ETXEN/RPD2/PMD14/RD2
EBID15/ETXCLK/RPD3/PMD15/RD3
SQICS0/RPD4/RD4
SQICS1/RPD5/RD5
EBIA15/RPD9/PMCS2/PMA15/RD9
RPD10/SCK4/RD10
EMDC/AEMDC/RPD11/RD11
EBID12/ETXD2/RPD12/PMD12/RD12
EBID13/ETXD3/PMD13/RD13
AN32/AETXD0/RPD14/RD14
AN33/AETXD1/RPD15/SCK6/RD15
71 EMDIO/AEMDIO/RPD0/RTCC/INT0/RD0
76 RPD1/SCK1/RD1
77 EBID14/ETXEN/RPD2/PMD14/RD2
78 EBID15/ETXCLK/RPD3/PMD15/RD3
81 SQICS0/RPD4/RD4
82 SQICS1/RPD5/RD5
68 EBIA15/RPD9/PMCS2/PMA15/RD9
69 RPD10/SCK4/RD10
70 EMDC/AEMDC/RPD11/RD11
79 EBID12/ETXD2/RPD12/PMD12/RD12
80 EBID13/ETXD3/PMD13/RD13
47 AN32/AETXD0/RPD14/RD14
48 AN33/AETXD1/RPD15/SCK6/RD15
IC1PD
PORT E
EBID0/PMD0/RE0
EBID1/PMD1/RE1
EBID2/PMD2/RE2
EBID3/RPE3/PMD3/RE3
EBID4/AN18/PMD4/RE4
EBID5/AN17/RPE5/PMD5/RE5
EBID6/AN16/PMD6/RE6
EBID7/AN15/PMD7/RE7
AN25/AERXD0/RPE8/RE8
AN26/AERXD1/RPE9/RE9
91 EBID0/PMD0/RE0
94 EBID1/PMD1/RE1
98 EBID2/PMD2/RE2
99 EBID3/RPE3/PMD3/RE3
100 EBID4/AN18/PMD4/RE4
3 EBID5/AN17/RPE5/PMD5/RE5
4 EBID6/AN16/PMD6/RE6
5 EBID7/AN15/PMD7/RE7
18 AN25/AERXD0/RPE8/RE8
19 AN26/AERXD1/RPE9/RE9
IC1PE
PORT F
EBID11/ETXD1/RPF0/PMD11/RF0
EBID10/ETXD0/RPF1/PMD10/RF1
EBIRDY3/RPF2/SDA3/RF2
USBID/RPF3/RF3
EBIA9/RPF4/SDA5/PMA9/RF4
EBIA8/RPF5/SCL5/PMA8/RF5
EBIRDY2/RPF8/SCL3/RF8
TDO/EBIA17/AN31/RPF12/RF12
TDI/EBIA18/AN30/RPF13/SCK5/RF13
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86 EBID10/ETXD0/RPF1/PMD10/RF1
57 EBIRDY3/RPF2/SDA3/RF2
56 USBID/RPF3/RF3
64 EBIA9/RPF4/SDA5/PMA9/RF4
65 EBIA8/RPF5/SCL5/PMA8/RF5
58 EBIRDY2/RPF8/SCL3/RF8
40 TDO/EBIA17/AN31/RPF12/RF12
39 TDI/EBIA18/AN30/RPF13/SCK5/RF13
IC1PF
PORT G
EBID8/RPG0/PMD8/RG0
EBID9/ETXERR/RPG1/PMD9/RG1
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EBIA4/AN13/C1INC/ECRS/RPG7/SDA4/PMA4/RG7
EBIA3/AN12/C2IND/ERXDV/ECRSDV/AECRSDV/RPG8/SCL4/PMA3/RG8
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TRD1/SQID1/RG12
TRD0/SQID0/RG13
TRD2/SQID2/RG14
AN23/AERXERR/RG15
88 EBID8/RPG0/PMD8/RG0
87 EBID9/ETXERR/RPG1/PMD9/RG1
10 AN14/C1IND/ECOL/RPG6/SCK2/RG6
11 EBIA4/AN13/C1INC/ECRS/RPG7/SDA4/PMA4/RG7
12 EBIA3/AN12/C2IND/ERXDV/ECRSDV/AERXDV/AECRSDV/RPG8/SCL4/PMA3/RG8
16 EBIA2/AN11/C2INC/ERXCLK/EREFCLK/AERXCLK/AEREFCLK/RPG9/PMA2/RG9
96 TRD1/SQID1/RG12
97 TRD0/SQID0/RG13
95 TRD2/SQID2/RG14
1 AN23/AERXERR/RG15
IC1PG
PORT C
EBIA6/AN22/RPC1/PMA6/RC1
EBIA12/AN21/RPC2/PMA12/RC2
EBIWE/AN20/RPC3/PMWR/RC3
EBIOE/AN19/RPC4/PMRD/RC4
OSCI/CLKI/RC12
SOSCI/RPC13/RC13
SOSCO/RPC14/T1CK/RC14
OSCO/CLKO/RC15
6 EBIA6/AN22/RPC1/PMA6/RC1
7 EBIA12/AN21/RPC2/PMA12/RC2
8 EBIWE/AN20/RPC3/PMWR/RC3
9 EBIOE/AN19/RPC4/PMRD/RC4
49 PIC32_24MHZ
72
73
50
IC1PC
VCC3V3
VDD
OUT
GND
SBY#
4
3
2
1
IC2
DSC1033-CC2-024.000
R18
0
X1
No Load
C11
100nF
C12
27pF
C13
20pF
GND
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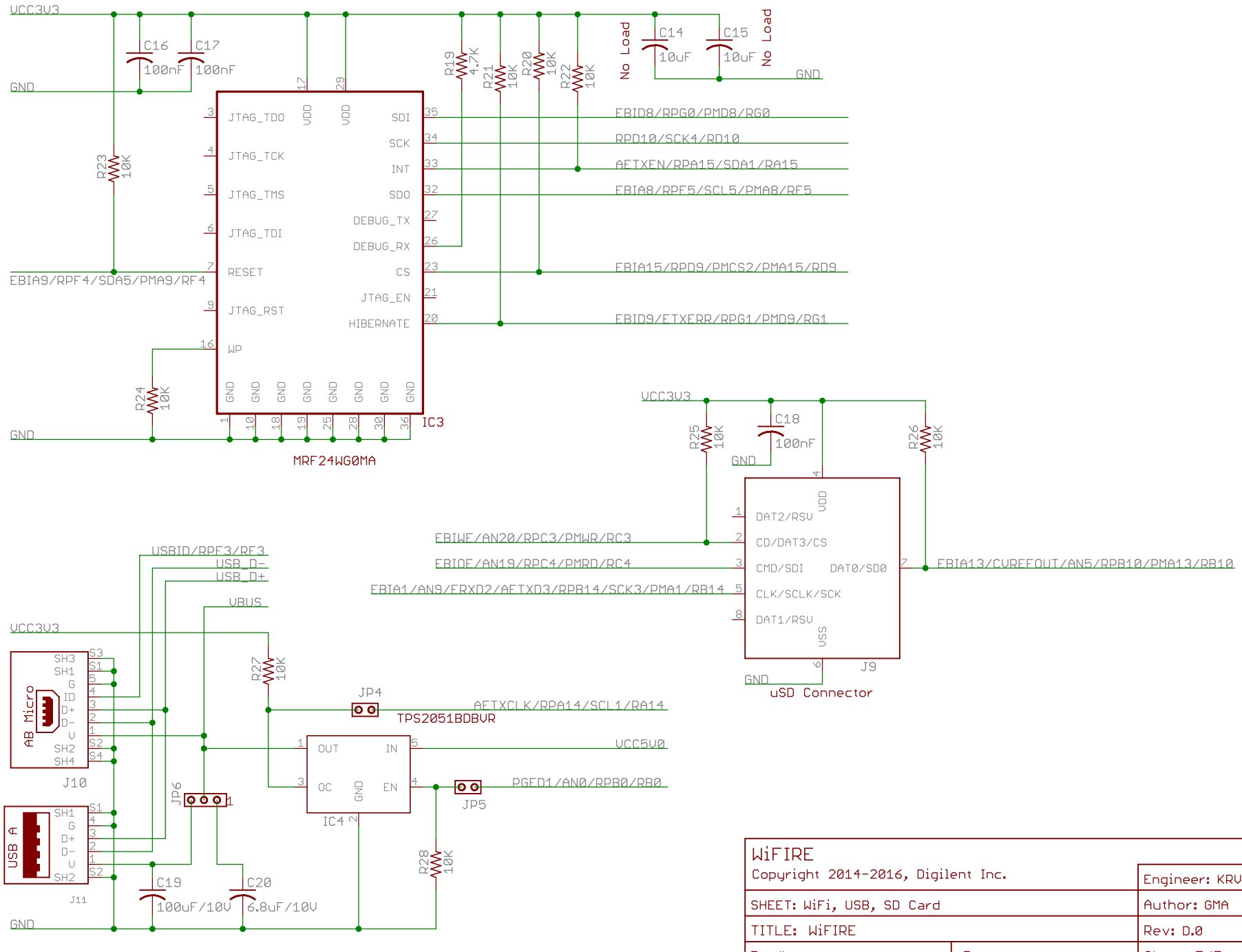
Sheet: 4/7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C17
100nF
GND
R23
10K
JTAG_TDO
JTAG_TCK
JTAG_TMS
JTAG_TDI
RESET
JTAG_RST
WP
VDD
VDD
SDI
SCK
INT
SDO
DEBUG_TX
DEBUG_RX
CS
JTAG_EN
HIBERNATE
GND
EBIA9/RPF4/SDA5/PMA9/RF4
R24
10K
MRF24WG0MA
IC3
R19
4.7K
R21
10K
R20
10K
R22
10K
No Load
C14
10uF
C15
10uF
No Load
EBID8/RPG0/PMD8/RG0
RPD10/SCK4/RD10
AETXEN/RPA15/SDA1/RA15
EBIA8/RPF5/SCL5/PMA8/RF5
EBIA15/RPD9/PMCS2/PMA15/RD9
EBID9/ETXERR/RPG1/PMD9/RG1
UCC3V3
R25
10K
C18
100nF
GND
R26
10K
DAT2/RSV
CD/DAT3/CS
CMD/SDI
CLK/SCLK/SCK
DAT1/RSV
VDD
DAT0/SD0
VSS
J9
uSD Connector
EBIWE/AN20/RPC3/PMWR/RC3
EBIOE/AN19/RPC4/PMRD/RC4
EBIA1/AN9/ERXD2/AETXD3/RPB14/SCK3/PMA1/RB14
EBIA13/CVREFOUT/AN5/RPB10/PMA13/RB10
USBID/RPF3/RF3
USB_D-
USB_D+
VBUS
UCC3V3
AB Micro
J10
R27
10K
JP4
TPS2051BDBVR
AETXCLK/RPA14/SCL1/RA14
OUT
IN
OC
GND
EN
IC4
VCC5V0
PGED1/AN0/RPB0/RB0
JP5
JP6
USB A
J11
R28
10K
C19
100uF/10V
C20
6.8uF/10V
GND
WiFIRE
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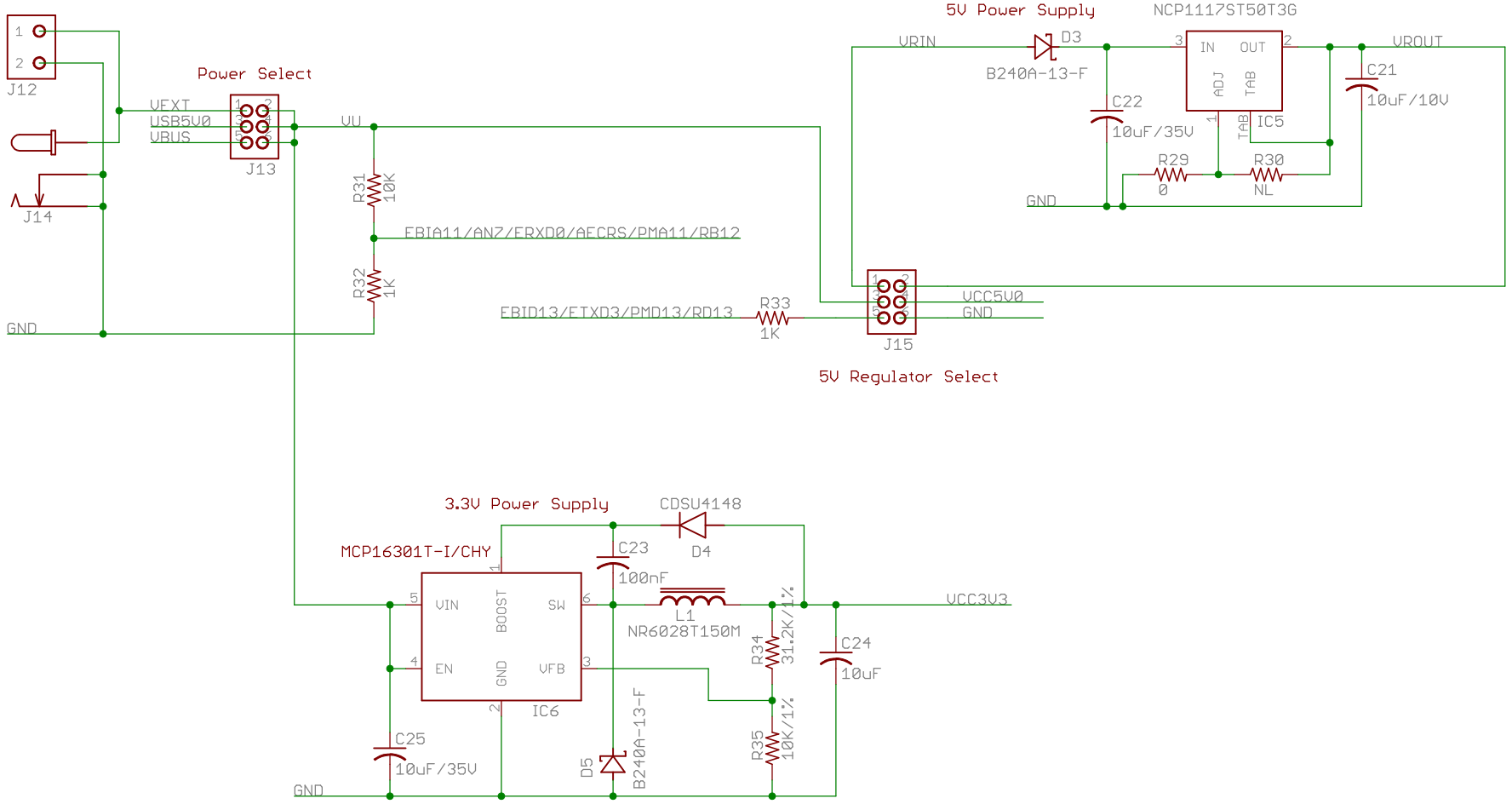
Engineer: KRV
SHEET: WiFi, USB, SD Card
Author: GMA
TITLE: WiFIRE
Rev: D.0
Doc#: 500-302
Date: 7/21/2016
Sheet: 5/7



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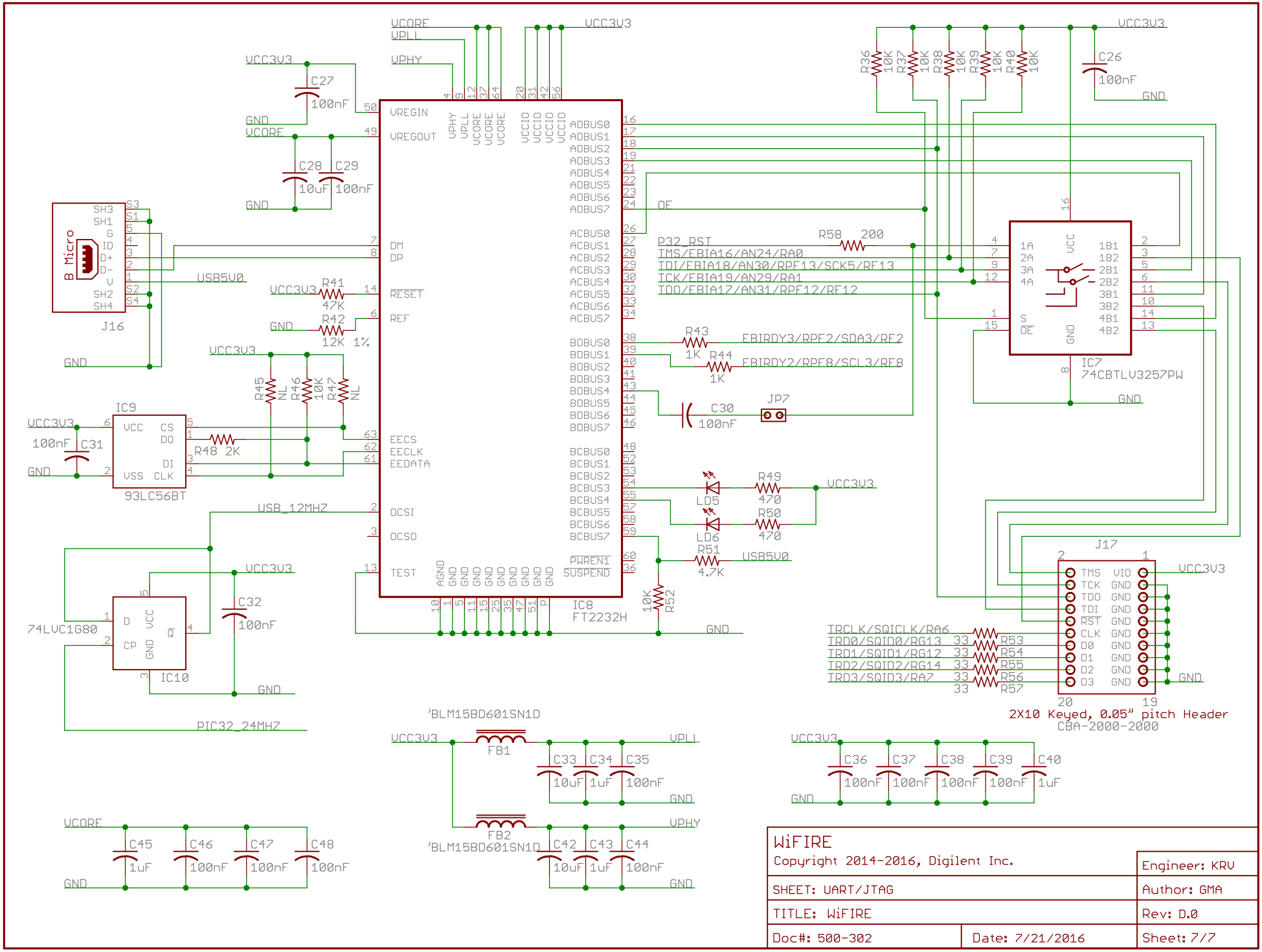
SHEET: Power Supplies		Author: GMA
TITLE: WiFIRE		Rev: D.0
Doc#: 500-302	Date: 7/21/2016	Sheet: 6/7


VCORE
VPLL
VPHY
VCC3V3
C27
100nF
GND
C28
10uF
C29
100nF
VREGIN
VREGOUT
ADBUS0
ADBUS1
ADBUS2
ADBUS3
ADBUS4
ADBUS5
ADBUS6
ADBUS7
OE
ACBUS0
ACBUS1
ACBUS2
ACBUS3
ACBUS4
ACBUS5
ACBUS6
ACBUS7
BDBUS0
BDBUS1
BDBUS2
BDBUS3
BDBUS4
BDBUS5
BDBUS6
BDBUS7
BCBUS0
BCBUS1
BCBUS2
BCBUS3
BCBUS4
BCBUS5
BCBUS6
BCBUS7
DM
DP
RESET
REF
EECS
EECLK
EEDATA
OSCI
OSCO
TEST
PWREN1
SUSPEND
IC8
FT2232H
B Micro
J16
USB5V0
R41
47K
R42
12K 1%
R43
1K
R44
1K
EBIRDY3/RPF2/SDA3/RF2
EBIRDY2/RPF8/SCL3/RF8
C30
100nF
JP7
R58
200
P32_RST
TMS/EBIA16/AN24/RA0
TDI/EBIA18/AN30/RPF13/SCK5/RF13
TCK/EBIA19/AN29/RA1
TDO/EBIA17/AN31/RPF12/RF12
R36
R37
R38
R39
R40
10K
C26
100nF
IC7
74CBTLV3257PW
IC9
93LC56BT
R45
NL
R46
10K
R47
NL
R48
2K
C31
100nF
LD5
LD6
R49
470
R50
470
R51
4.7K
R52
10K
USB_12MHZ
PIC32_24MHZ
74LVC1G80
IC10
C32
100nF
J17
TMS
TCK
TDO
TDI
RST
CLK
D0
D1
D2
D3
VIO
2X10 Keyed, 0.05" pitch Header
CBA-2000-2000
TRCLK/SQICLK/RA6
TRD0/SQID0/RG13
TRD1/SQID1/RG12
TRD2/SQID2/RG14
TRD3/SQID3/RA7
R53
R54
R55
R56
R57
33
'BLM15BD601SN1D
FB1
FB2
C33
C34
C35
C36
C37
C38
C39
C40
C42
C43
C44
C45
C46
C47
C48
1uF
WiFIRE
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Engineer: KRV
SHEET: UART/JTAG
Author: GMA
TITLE: WiFIRE
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